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POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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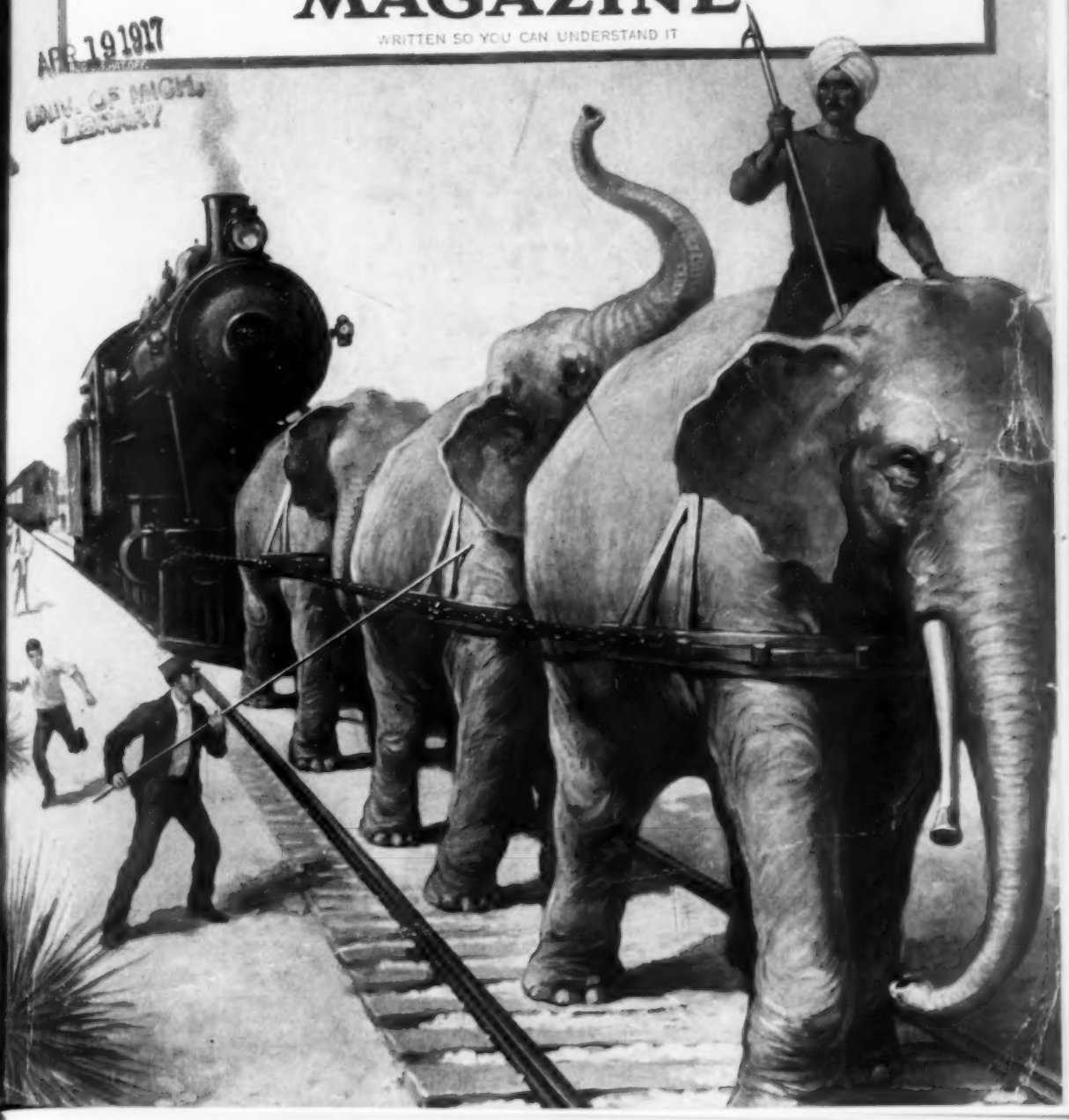

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When you "Build-To-Stay—The Harris Way," you secure the *utmost possible* in Quality, Economy and Service. Why? Simply because you profit directly—*immediately*—by our 24 years' experience. You get the benefit of our practical knowledge as the *originators* of the "Direct-to-You" Home Building Industry. We were the *first* to sell Lumber and Material direct to Home Builders at one small profit. We were the *first* to reduce this vitally important industry to a *perfect system* and extend the benefits uniformly to the people of the nation. *The splendid Harris Home above has 5 rooms, bath, pantry and reception hall in an excellent arrangement. The size is 22 ft. x 26 ft.*

"THE HARRIS WAY"

has exclusive merits—special advantages for the shrewd and careful Home Builder—possessed by no other plan or method. It is the best, safest and most sensible way to build your ideal home *right* without sacrifice of quality—*or the waste of a single penny!* Thousands have built "The HARRIS WAY" with profit and satisfaction.

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Our ten million dollar buying power gives Harris customers an overwhelming price advantage. We can—*and do*—undersell all others. The *proof?* Easy! Just send us your lumber bills—for any kind of building you may be planning and get *our* prices. Compare them item for item, and let the *test* be the *proof.* Write us today!

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Please send me free—without the slightest obligation—the Harris Home Book of Plans, and show me how to save big money in building my home.

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Free Beautiful New $10,000 Book of Over 100 Harris Homes

Be sure to mail free coupon for the latest edition of the famous $10,000 HARRIS HOME PLAN BOOK, now ready. A golden guide to Quality, Service and Economy in Home Building. Explains—fully and freely—everything about building economy. Contains 100 modern Harris Home Designs, with descriptions, material, specifications, prices, etc., and explains how we save you $50 to $75 on our Special Free Architect's Plans. Think twice before you pass this opportunity.

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Popular Mechanics Magazine

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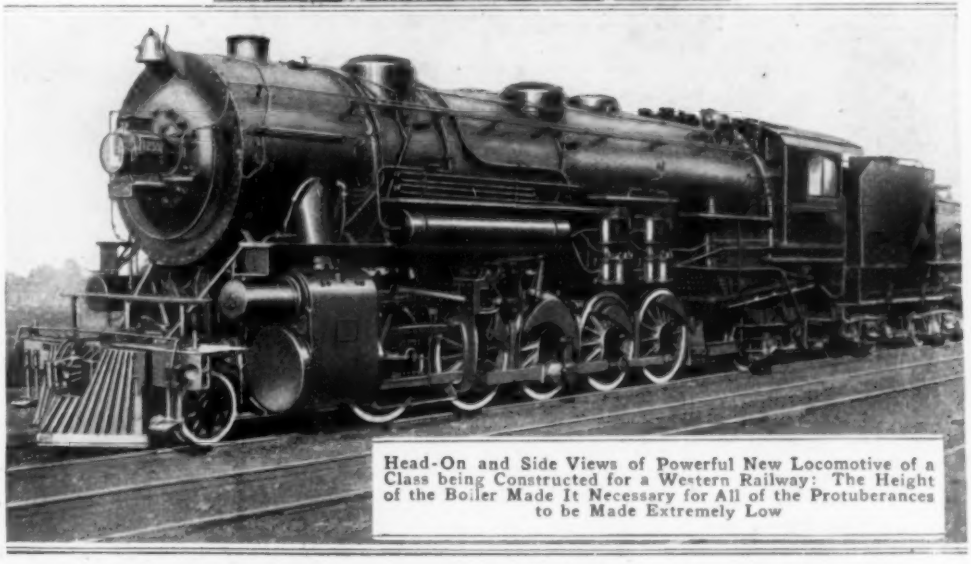
Vol. 27 MAY, 1917 No. 5

Interesting Engine Built for Western Road

MOST striking is the appearance of a powerful locomotive that has lately been constructed for the Denver & Rio Grande Railway. Although it is one of the largest engines of the single-expansion, nonarticulated class, its chief interest to the layman doubtless lies in the peculiarities of its design. The boiler is of such height that it was necessary to dwarf all of the upper protuberances in order to permit operation beneath low bridges and through certain tunnels. In building it, the sand boxes were installed at the sides, instead of at the top, the steam dome was built exceptionally low and broad, the smokestack was given a height of only a few inches, and the bracket supporting the bell was attached to the front of the smoke box above the headlight. The engine, which is one of several of a type being placed in service, is thoroughly equipped with devices designed to facilitate operation and lighten the work of the enginemen. A mechanical stoker, actuated



Head-On and Side Views of Powerful New Locomotive of a Class being Constructed for a Western Railway: The Height of the Boiler Made It Necessary for All of the Protuberances to be Made Extremely Low

Newsdealers will have the June issue of Popular Mechanics Magazine on sale May 20th.

both by steam and compressed air, feeds pulverized coal to the fire. In cases requiring hand stoking, the door of the fire box is opened and closed by power. There are no large, heavy levers for the pilot to manipulate, for compressed air again is brought into play. Alone, the locomotive weighs 428,500 lb., and with the tender, 624,900 pounds.

ADAPTABLE NAVY PEDESTAL FOR MACHINE GUNS

The nation wide discussion of measures for increasing our defenses on sea gives added interest to a machine - gun pedestal for the navy, manufactured by a Buffalo concern. This mounting is designed to be fastened to the deck of a coast cutter, or harbor-patrol boat, etc. It consists of a base with gun mounting, and is so constructed that a complete circle can be described in the operation of the gun regardless of the angle at which it is placed. The firing piece can be elevated to practically 90° or pointed lower than horizontal. If desired, two seats can be attached to the base.

A Machine-Gun Navy Pedestal so Constructed That a Weapon Mounted on It can be Pointed in Any Direction at Any Vertical Angle up to 90 Degrees

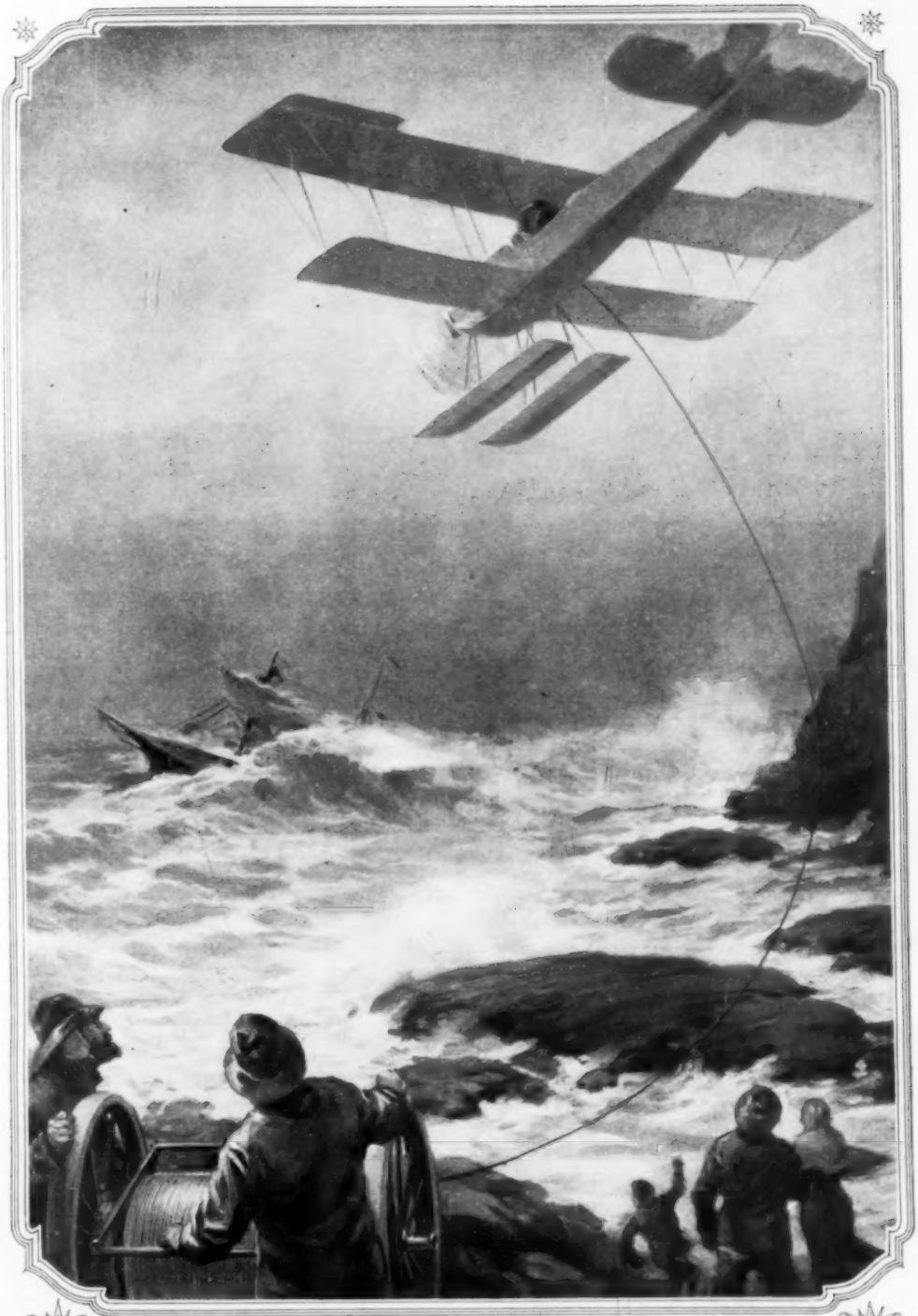
¶ An electric steel furnace, which has been operating in Duquesne, Pa., since last November, produces 30 tons of steel in each heat, and is said to be the largest electric steel furnace in the world.

SUPPLY OF SINGING BIRDS CUT OFF BY WAR

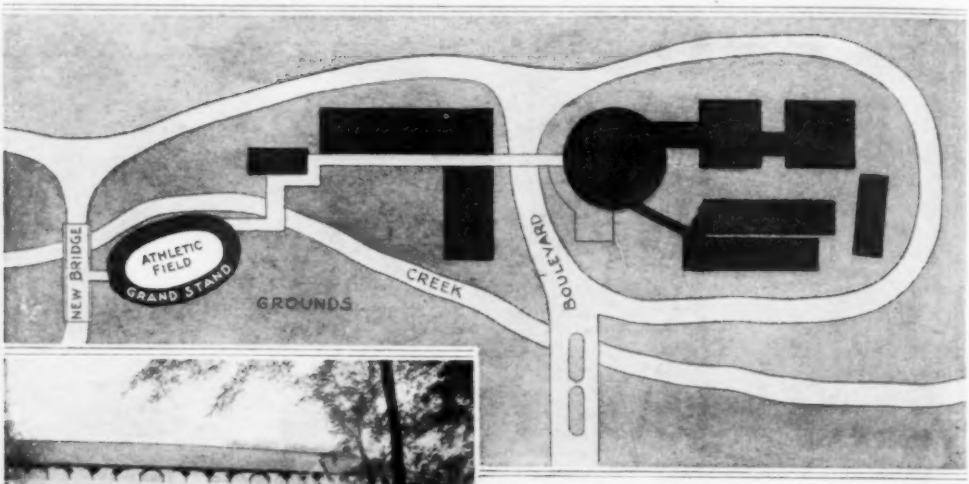
One of the sidelights of the great war is furnished by the disappearance from the market of singing canary birds, of which many thousands were formerly imported annually from Germany, where their breeding and training occupied many of the peasants of the Hartz Mountains and neighboring districts. War conditions, it is said, have caused the birds practically to disappear in the Hartz. The services of the inhabitants have been otherwise required and the birds have lacked their customary supplies of food, so that the region will have to be restocked after the war before a fresh supply of the familiar songsters is available for export. As a consequence, the price of canaries, which before the war was about $3 or $4 in Chicago bird stores, has jumped to $12 or $15, and there are few to be had at any price.

COAST-GUARD STATIONS TO USE AEROPLANES

Aeroplanes will be added to the equipment of the United States Coast Guard stations to aid in rescue work, if recent proposals are adopted. Many a vessel has been wrecked on the rocks at a point too far from shore to be reached by the line-throwing gun, and while the sea was running so high that the imperiled crew and passengers could not be rescued with lifeboats. In such a case a flying boat would be called on to carry a life line out to the distressed vessel. Another task which the air craft may be employed in is locating derelicts so that they can be removed as quickly as possible from navigation routes.



The Fury of a Stormy Sea, Lashing Hidden Reefs off the Shore, has Baffled Shipwrecked Sailors and Life-Savers Countless Numbers of Times, but Now It is Proposed to Lend Aid to Those in Distress, despite the Storms and Reefs, by Means of Air Craft as Graphically Portrayed Herewith. Ships are Often Grounded Out of Reach of Line-Throwing Guns and Lifeboats, and to Overcome This Fatal Handicap, the Equipment of Our Coast-Guard Stations with Flying Boats is Contemplated



Ground Plan of the West Baden Resort, Showing in the Center the Old Road, Now Boulevarded, Which Brought Farm-Wagon Traffic Too Close to the Hotel Verandas: The New Road Is at the Left

New Concrete Bridge Built to Divert Farmers from the Grounds of an Indiana Resort: Baseball Grand Stand in Background

HOTEL BUILDS BRIDGE TO DIVERT FARM TRAFFIC

In order to divert farm traffic from a county road running in front of a hotel at West Baden, Ind., the proprietors of the resort recently spanned a neighboring creek with an attractive concrete bridge connecting new sections of road which shorten local travel for the farmers and obviate the necessity of rural traffic passing through the hotel grounds. The new road and bridge were turned over to the county, while the old thoroughfare was boulevarded, paved with brick, planted with grass along the center, and illuminated with street lamps for the convenience of motorists and guests of the pleasure resort. The new bridge on the public road is 300 ft. long, with a wagon road 14½ ft. wide, and a 7½-ft. walk. Midway of its length is an exit to the walk from the grand stand of a ball park. The bridge is constructed of steel beams and concrete, finished in stucco.

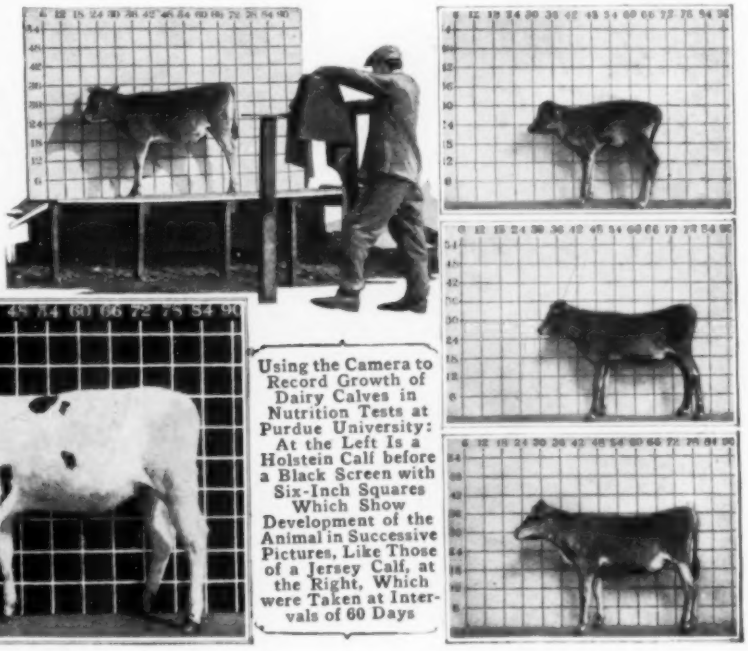
SIDEWALK MONEY CHUTE FOR RELIEF FUNDS

Small cash contributions to the Belgian relief fund were solicited and collected in a novel way by the installation of a money chute, with appropriate signs, outside the relief headquarters in Boston. A 4-in. iron tube, passing through a hole in the sidewalk to a strong box in the basement, was topped with a large funnel at a convenient height to receive the cash offerings of pedestrians as they passed. Both pipe and funnel were painted with the Belgian colors—black, yellow, and red—and a conspicuous sign read: "Money Dropped Here Goes Direct to Belgium."

¶ The cost of seed potatoes for home gardens may be practically eliminated, it is said, by planting potato peelings which are cut a little deeper than ordinarily under the eyes.

NEW METHOD OF TESTING DAIRY-CALF FOODS

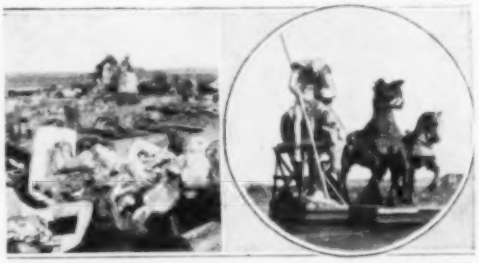
An interesting series of experiments was conducted recently at Purdue University to determine the nutritive value of skim milk and milk substitutes in feeding dairy calves. Instead of relying solely upon tabular records, individual photographs were taken of each of the trial animals, showing their general appearance and development at regular 30-day intervals during the tests. Thirty calves of three different breeds were used in the experiments, these being divided into three lots and fed three distinct rations for a period of 180 days. At the end of each 30 days the calves were photographed under the same conditions. The camera was placed on a stationary support, at the same height and distance for each exposure, the calves standing upon a convenient platform, with a background screen, divided into 6-in. squares. The background was black or white according to the general color of each calf. In this way the development of each animal was clearly shown by the photographs and the merits of the respective rations could be judged. Incidentally it was found that the average monthly growth of dairy calves is from 1½ to 2 in. in height under proper care and feeding.



Using the Camera to Record Growth of Dairy Calves in Nutrition Tests at Purdue University: At the Left Is a Holstein Calf before a Black Screen with Six-Inch Squares Which Show Development of the Animal in Successive Pictures, Like Those of a Jersey Calf, at the Right, Which were Taken at Intervals of 60 Days

EXPOSITION STATUARY IN DESOLATE SURROUNDINGS

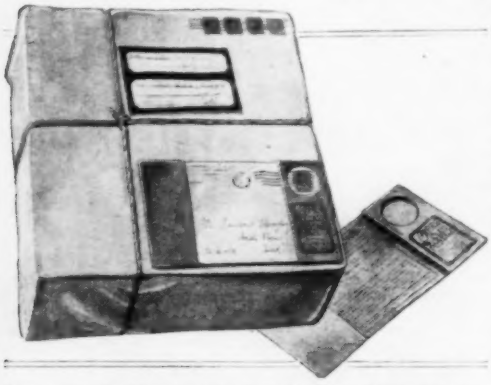
Much of the statuary that adorned the buildings of the Panama-Pacific Exposition has lost all its impressiveness by being assembled, indiscriminately, near the water front of the exposition grounds. The weather and souvenir hunters have shared in defacing these abandoned works of art. However a few have so far escaped unmolested. One such is "The End of the Trail." This statue of an exhausted horse and rider seems strangely in accord with its surroundings.



Two Views of the Panama-Pacific Exposition Water Front, Showing the Accumulated Statuary That is being Defaced by Weather and Souvenir Hunters. "The End of the Trail" so Far has been Injured But Little

NOTE ACCOMPANIES PACKAGE WHEN PUT IN HOLDER

Quite an ingenious envelope holder is being gotten out which enables a catalog or parcel to be accompanied by

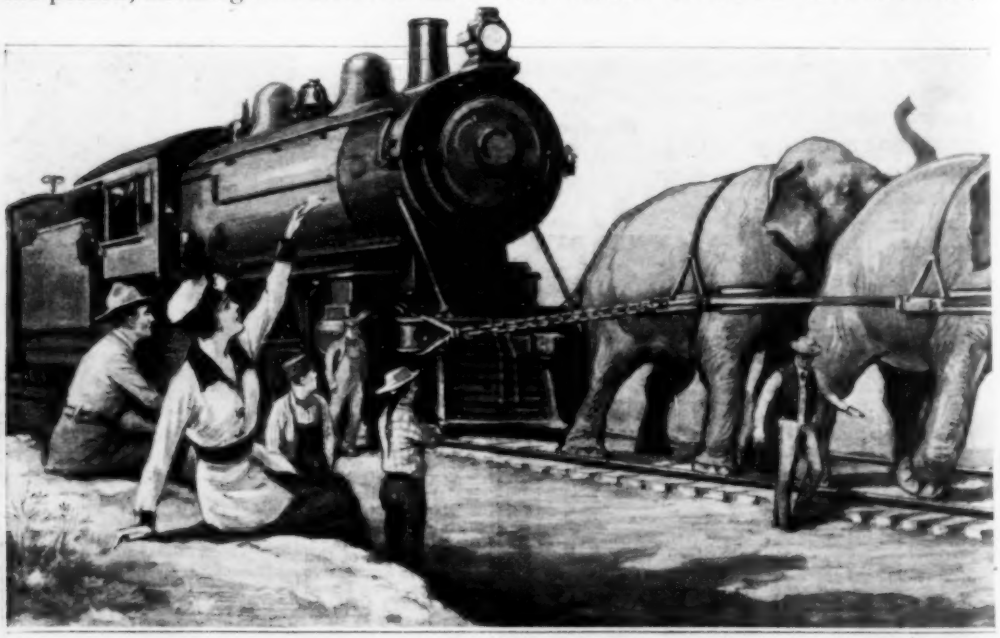


When the Holder is Attached to a Package and an Envelope Inserted in It, Both Pieces of Mail will Reach Their Destination Simultaneously

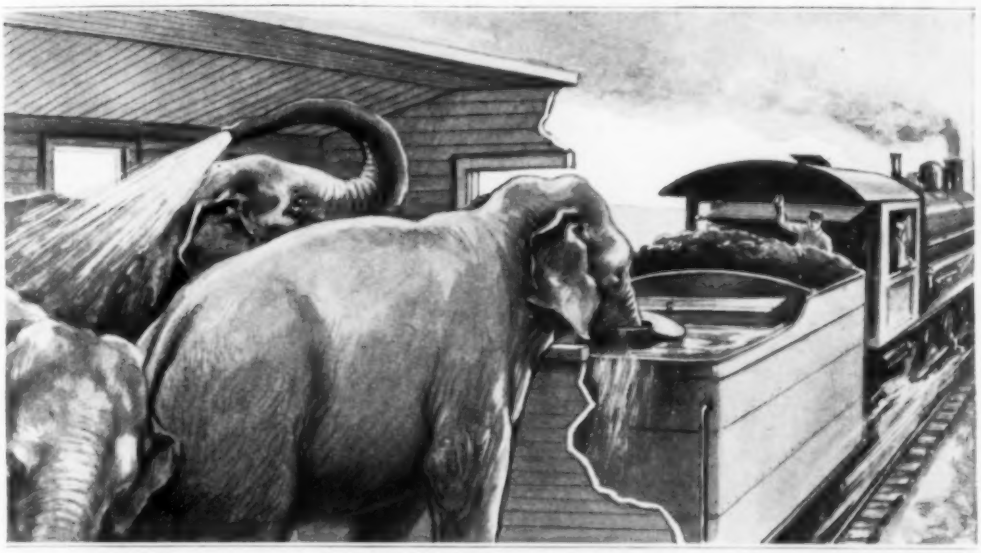
a letter so that the two pieces of mail, although of separate classes, will reach their destination simultaneously. Frequently in forwarding a parcel-post package to an individual, a business house will direct a communication to the person, advising him that such and such has been dispatched "under separate cover." The letter is most often delivered several days before the other piece of mail, and therefore loses whatever effect it might otherwise have had. The envelope holder, which may be attached to the outside of a package, overcomes this condition. It consists of a piece of paper gummed on one side and having, at opposite ends on the other surface, flaps into which an envelope can easily be inserted. A circular opening at the top of one flap exposes the stamp. Both package and letter must be individually addressed and provided with the proper postage.

ELEPHANTS COMPELLED TO HAUL A CIRCUS TRAIN

When a circus train on the Southern Pacific came to an involuntary stop near Galveston not long ago, investigation by the engineer revealed the cause, it is reported, in a carload of elephants right behind the water tank of the engine tender. Being athirst and dusty, the intelligent animals had reached with their trunks through the end window of the car into the tank,

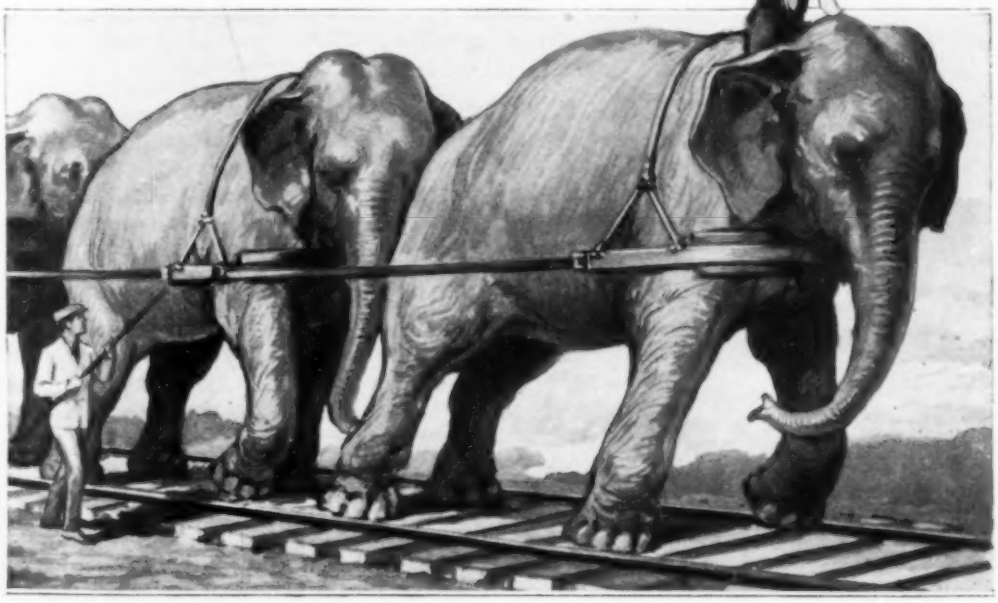


When Their Train Came to a Standstill Because They had Stolen the Engine's Water Supply. These Four Water Supply. This Remarkable Scene is Reported to have



Elephants Emptying the Water Tank of a Locomotive Drawing a Circus Train: The Sketch Shows How the Big Animals Reached through the End Window of Their Box Car into the Tank. Lack of Water Stopped the Train

and every drop of the water had gone to assuage elephantine thirst and spray vast areas of dusty hide. The elephant trainer was called from the caboose to a consultation and solved the problem of moving the stalled train by unloading the four offending elephants, who were then hitched in tandem in front of the locomotive and compelled to pull the engine for a distance of three miles along the track to the nearest water supply, where the tender was replenished.



Elephants were Hitched in Front of the Locomotive and Compelled to Pull the Engine Three Miles to the Nearest Occurred on the Southern Pacific Railroad, Near Galveston, Texas

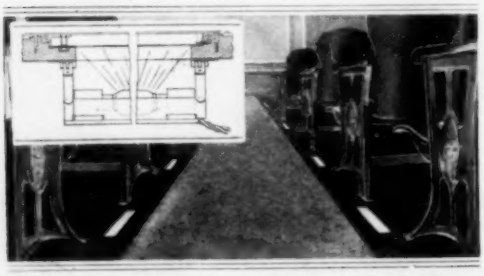
NEW STYLE OF INDIVIDUAL PHOTOS IN MOTION

With a motion-picture camera recently invented by a New York man, individuals or groups can now have a series of photographs taken while they wait, at very small expense, for reproduction either by a projector attached to a similar camera in the home or by means of a booklet arrangement of the finished photographs, to be flipped over rapidly by hand. Such a booklet, containing, say, 36 consecutive pictures of the subject in motion, can be retailed for 25 cents or 50 cents, while the camera itself, with the projecting attachment, is designed to be sold at a moderate price, so that motion pictures can be both taken and reproduced at home. For taking the pictures a daylight-loading film or plate holder is provided with both a vertical and a lateral movement, so that 36 small impressions of an object in motion may be quickly made in six rows on the film or plate. When developed, enlarged prints are quickly prepared from the small impressions, placed in a pack in successive order, and bound to form a booklet. Snapping over the leaves gives the effect of moving pictures.

Booklet of Individual Photographs Which, When Snapped Over between the Thumb and Finger, Give the Impression of a Moving Picture

THEATER AISLES LIGHTED FROM RECESSES IN FLOOR

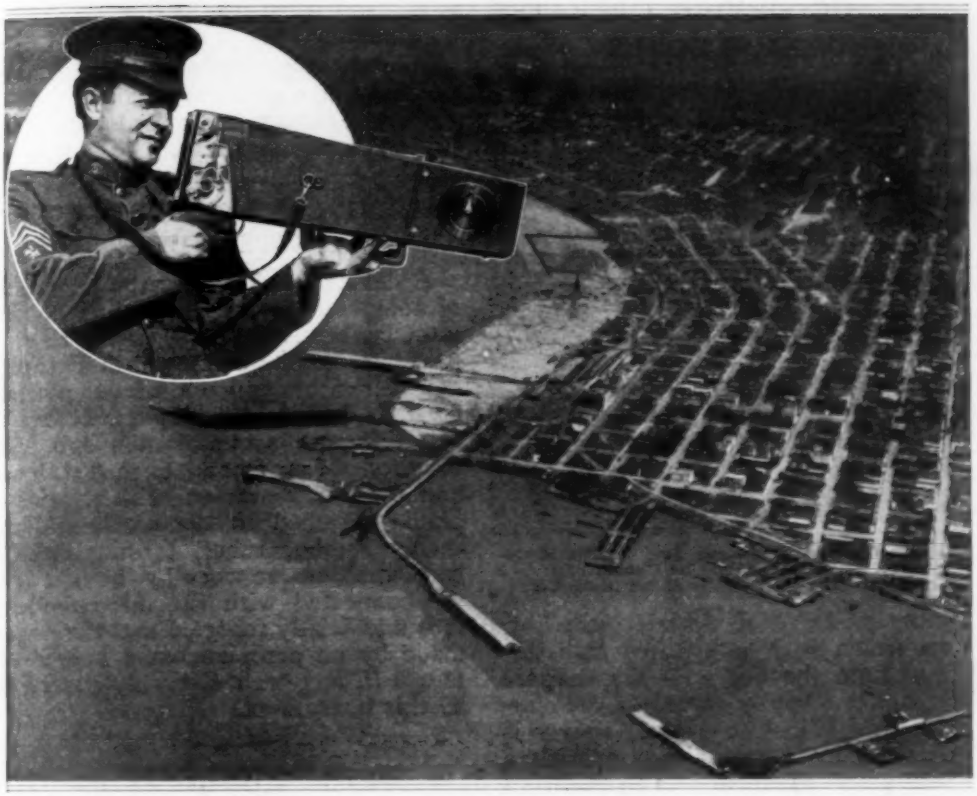
A system of lighting theater aisles from recesses in the floor has been patented in England, the advantage of which is that it does not interfere with the presentation of motion pictures or illuminate a darkened stage. Under this arrangement pockets containing electric bulbs are located at the ends of the rows of seats and are covered with transparent or translucent glass. If desired, advertising can be inserted under the glass in the form of transparencies. The lamps can be made to light automatically when anyone steps on the covers.



Lighting System for Theater Aisles in Which the Electric Lamps are Installed in Recesses in the Floor at the End of the Seat Rows

"GUN-TYPE" SCOUT CAMERA USED BY OUR AIRMEN

Europe's war has demonstrated the importance of aerial photography and moreover has brought it quickly to a high stage of development. Although military aviation has been seriously



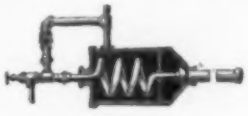
San Diego's Water Front, Business District, and Environs as Seen by New Aerial Scout Camera. Insert Shows the Camera Held in the Position in Which It is Used by an Aerial Photographer

neglected in this country, this particular phase of it, contrary to what is doubtless the popular impression, has not been entirely overlooked. Of late a new and apparently promising camera of the "gun type" has been developed and placed in the hands of official photographers of the flying corps. It has a telescopic lens of a 24-in. focal length, is supplied with sights, and is light in weight, although somewhat elongated. The shutter is controlled by a trigger like that of a gun. Detailed photographs have been made with the instrument from great heights. It is considered likely by certain authorities that American scouting cameras of the future will follow the lines of this machine.

¶A jewelry firm is making over defective cartridge shells, bought from a munitions firm, into flower vases.

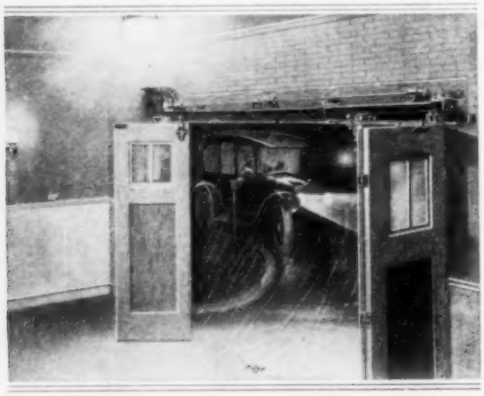
NEW FUEL-OIL BURNER FOR STEAM PLANTS

In industrial plants where oil is used as fuel, the problem of firing is simplified by a new oil burner designed and patented by a Florida engineer. This burner, it is claimed, produces a clean, clear flame, free from unburned oil, uses a minimum amount of steam for atomizing, and can be used for months without requiring cleaning or repairs. It consists essentially of a metal body containing a coil in which the fuel oil is heated by steam, then ejected to be vaporized with the steam and passed into the furnace through a length of piping with special tip. There are no complicated parts.



ELECTRIC DEVICE OPERATES GARAGE DOORS

Opening and closing the folding doors of garages, and other buildings,



With the Overhead Apparatus Seen in This Photograph, the Garage Doors may be Opened or Closed by Pressing a Button While Seated in the Car

by the pressure of electric push buttons which may be situated at a distance from the doors, is the purpose of a device recently placed on the market by an Illinois concern. Power is furnished by a small motor, with a worm-wheel connection to an overhead shaft bearing two pairs of bevel gears, which work in connection with the doors. The push-button controls may be located at as many stations as desired, each station having three buttons, one for opening, one for closing, and one for stopping the doors at any position desired. A safety attachment prevents injury to any person or thing standing in the way when the doors are operated.

WATERPROOF FABRIC MADE OF CORK AND CLOTH

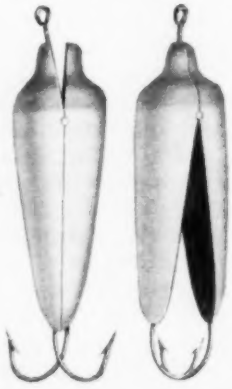
A new waterproof fabric has recently been produced in France which is made partly of cork, and in addition to being impervious to moisture, is said to be very durable and a nonconductor of heat. The cork is cut up into very thin slices and then placed in chemical baths to remove certain resinous substances that tend to give it brittleness. As finally prepared, the thin sheets are so pliable that they can be bent double without being injured. By gluing them to cloth with a suitable preparation, a fabric is obtained that is light and strong, and affords complete protection against rain.

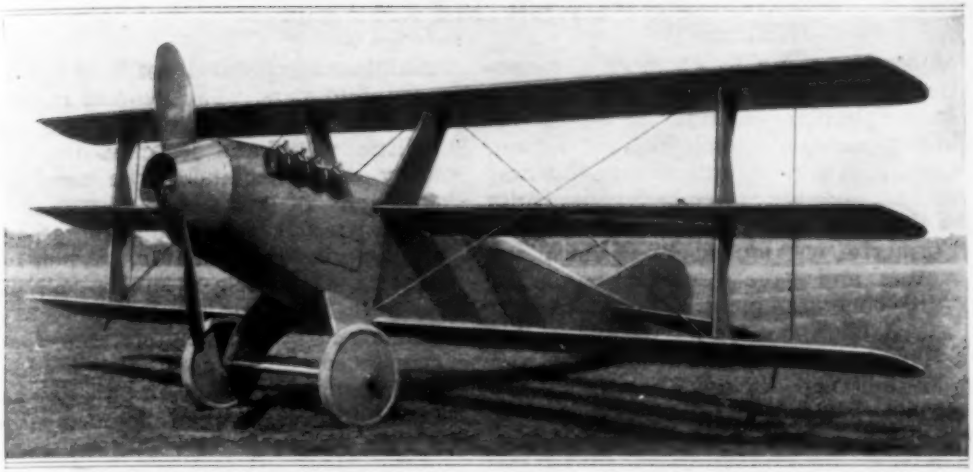
AEROPLANE MICROPHONE TESTED HERE

A device for detecting the approach of aeroplanes is being tested at Governors Island, New York, which resembles instruments employed in Paris to discover the approach of enemy air craft, as described in Popular Mechanics Magazine some months ago. It consists of four megaphones, 6 ft. long and 3 ft. in diameter, with a microphone attached to the small end of each. Rubber tubes, terminating in earpieces that are worn by the listener, are connected with the microphones. It is unofficially reported that the noise made by an aeroplane at a height of 11,000 ft. has been distinctly recorded by this instrument.

MUSKELLUNGE BAIT WITH FOLDING HOOKS

A new lure for muskellunge, and other large game fish, invented by a Chicago man, resembles in size and form the open mouth of a slim fish and is furnished with a pair of hooks that are normally folded on one another with the barbs inside. When a big fish bites at the bait, the jaws of the lure close and the hooks open outward in such a way as to hold the victim securely. The size for muskellunge is 4 in. long and 1¼ in. in diameter, painted light blue and silvery white, with jaws of red. It is also made with a finish of luminous paint.





This Fleet Little Curtiss Triplane, Designed as a Pursuit Machine for Military Purposes, has Shown a Speed of 120 Miles an Hour and Climbed at the Rate of 1,000 Feet a Minute

OUR NEW AIR CRAFT

By SEARLE HENDEE

IN even remote European villages the passage of air craft is so commonplace that it fails to attract the attention of children at play. Traffic falters and pedestrians twist their necks heavenward, however, on those rare occasions when an aeroplane darts across the skyline of an American metropolis.

In spite of this contrast, American progress in aeronautics is gathering momentum. Our plants are building aerial cars and boats that compare favorably with the best foreign machines. Furthermore, they are developing some of the most prodigious craft that have ever taken to the air.

Significant, in view of the popular conception of flying as extreme dare-deviltry, is the record of the United States Army aviation service from Jan. 1 to Dec. 26, 1916. During that period 7,087 flights were made by military pilots. In all, 3,357 hours were spent in the air; which means that more than nine hours each day of the year some soldier-airman was aloft. The distance traveled amounted to approximately 251,775 miles, or slightly more than ten times the circumference of the earth. There was no fatality. Evidently these figures cannot be fairly compared with current railroad and motor-car statistics. Contrasts are not needed, however, to accent their import. Sane flying is not yet accident-proof, and possibly never will be, but neither is it extremely foolhardy.

The Novel Mounting of the Propeller Makes the New Gallaudet Seaplane Especially Interesting. The Arrangement Permits the Use of a Streamline Fuselage and Affords Pilot and Observer Unobstructed Vision

Europe's war has done more than

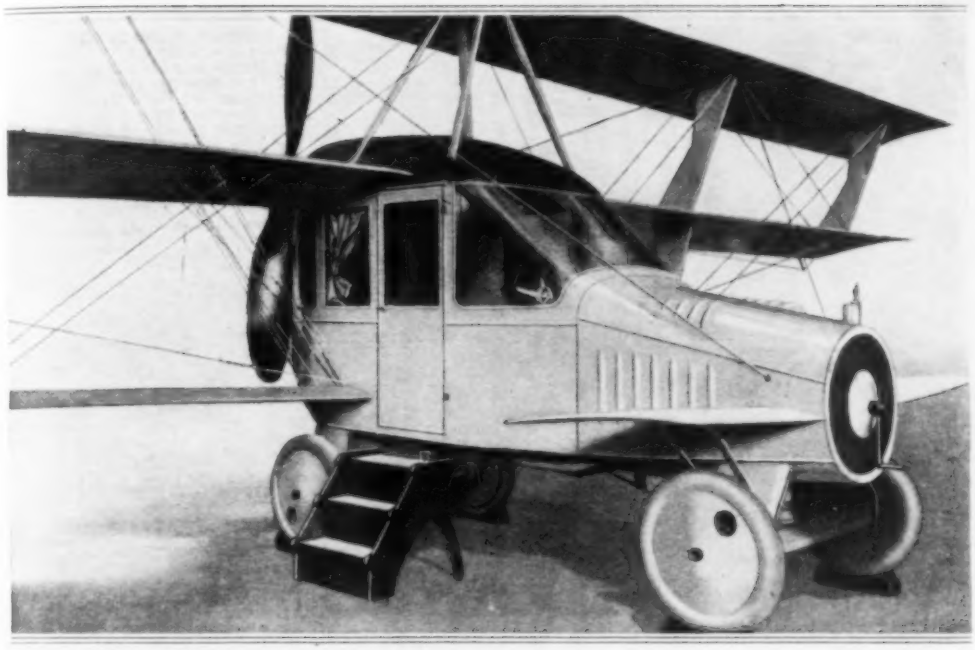
any other thing to promote aeronautics in this country. It has aroused some popular interest in aerial vehicles, stimulated congress to action, and given our manufacturers the first real support they have had. The fruits of this awakening have begun to ripen. Formerly we looked to France for motors and gave domestic engineers little encouragement. The situation has changed and we have a dozen different types of power plants, in the class between 125 and 300 hp., that are good. We are building planes that make 125 miles and more an hour. We are producing craft designed to lift from 10 to 15 tons. Furthermore, what is considered the largest aeronautic research and testing laboratory is a part of an eastern aeroplane factory.

What then of the American machines for 1917? The trend is chiefly toward military craft, with tractors strongly predominating. This is true of both aeroplanes and flying boats. There is a particular need for small, swift scouting machines of great climbing power. In providing the latter quality we are improving slowly. Builders are devoting chief attention to fast reconnaissance tractors. These are almost entirely biplanes. The demand for stanch, large battleplanes capable of mounting several guns is an important one, and this eventually will doubtless affect the development of commercial vehicles. Several sporting models have been announced. Those in touch with the situation feel that the general adoption of pleasure craft will precede any marked use of commercial carriers just as the touring car came before the truck in the automobile world. It remains for the future to determine the accuracy of this reasoning. Already there is a serious movement toward the establishment of aerial postal service, a thing which unquestionably would exert profound influence in favor of commercial aerial transportation.

While the biplane is holding the field, the triplane is once more making its appearance. This is particularly interesting in view of the opposition to multiplanes expressed not long ago by many engineers. The general impression has been that a third plane was of little value and lessened the efficiency of a machine. The need for aeroplanes of great size and weight has drawn attention of designers back to three-wing construction. When the weight of a vehicle is multiplied, the area of its supporting surface must also be enlarged proportionately, since any pronounced increase in the landing speed is impracticable. In biplane construction a wing spread of much more than 100 ft. presents difficulties, structurally and otherwise. Recent investigation has proved that when given the needed power, a triplane, although not quite so efficient as a biplane, will carry almost the same load as the latter. All of which means that the wing spread of a dual-plane craft can be reduced 25 per cent or more by adding a third supporting surface. Hence the introduction of the 1917 triplane.

Triplanes are displayed more in Curtiss products than in others. One astonishing little craft of this type is the new Curtiss pursuit machine which has a wing spread of only 25 ft. and an over-all length of 18 ft. It has attained a speed of 120 miles an hour and climbed 1,000 ft. a minute. The engineers expect to improve the speed at least five miles an hour. It is an exceedingly trim tractor, weighing not much more than 1,100 lb., and is driven by an eight-cylinder, 100-hp. motor. Several of the speedsters have been built for the War Department.

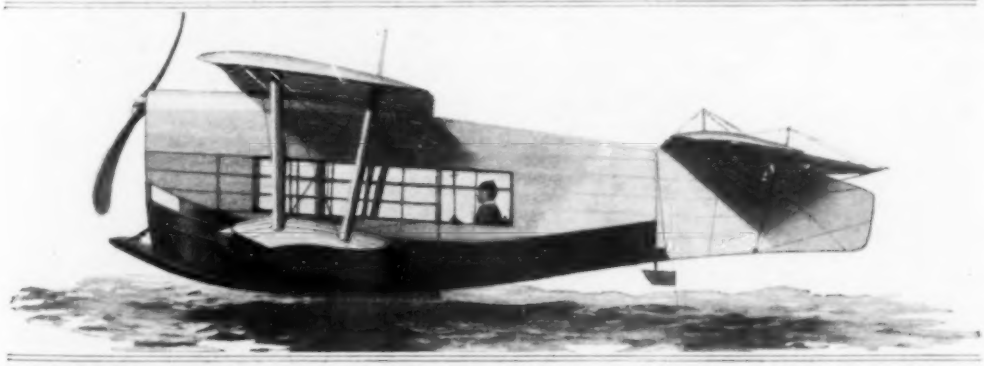
More spectacular than this is the Curtiss autoplane, which proved to be one of the principal attractions at the recent aeronautic exposition. It is virtually a "family touring" plane and in appearance is not unlike a streamline limousine to which wings have been attached. The upper two planes are of 40½ ft. spread, but the lower one has a reach of only 23⅓ ft. The speed range is from 45 to 65 miles an hour, while the lifting capacity permits a useful load of 710 lb. to be carried. The interior of the car affords upholstered seats for two passengers and a pilot.



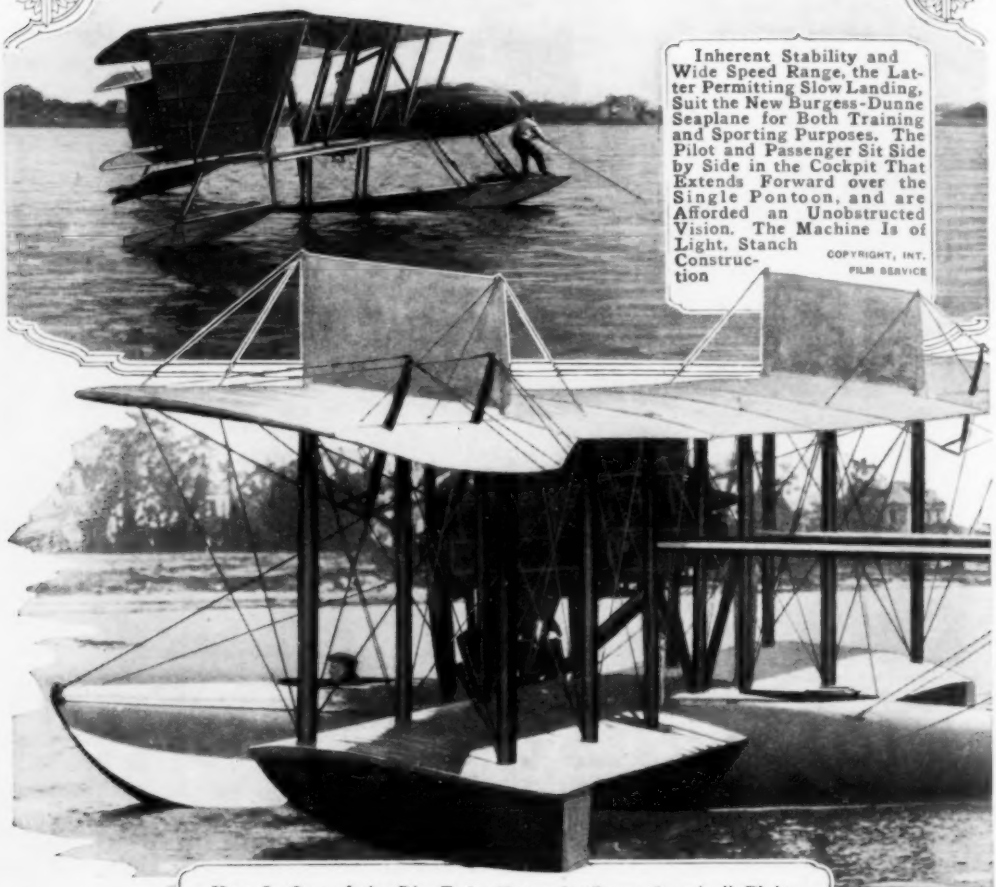
COPYRIGHT, UNDERWOOD & UNDERWOOD
One of the Season's Most Radical Models Is the Curtiss Autoplane, an Aerial Limousine for Private Touring. Seats are Provided for a Pilot and Two Passengers. The Speed Range Is from 45 to 65 Miles an Hour

The motor, of 100 hp., is situated beneath the hood at the front and drives a pusher propeller of four blades. Although ultradistinctive in this country, the craft is not the first of the sort ever built. Before the war a machine of similar characteristics was constructed for M. Henry Deutsch de la Meurthe, president of the Aero Club of France.

Of all the new machines that have been produced, a Curtiss seaplane, shipped a few months ago to the British Admiralty, is probably the most astonishing. Little information concerning its structural features has become known, for secrecy shrouded its development. It is a triplane mounting four motors that generate 1,090 hp. Its wings spread 135 ft., while its possible speed is about 100 miles an hour. Eight men, several guns, and 600 gal. of fuel are carried by it. The machine was shipped abroad without being



Inherent Stability, Simplicity of Control, and Slow Landing Speed Are Three of the Things That Make the Lawrence Airplane, a Combination Land and Water Machine, Especially Attractive for the Sportsman



Inherent Stability and Wide Speed Range, the Latter Permitting Slow Landing, Suit the New Burgess-Dunne Seaplane for Both Training and Sporting Purposes. The Pilot and Passenger Sit Side by Side in the Cockpit That Extends Forward over the Single Pontoon, and are Afforded an Unobstructed Vision. The Machine Is of Light, Stanch Construction

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Here Is One of the Big Twin-Motored "Super-America" Flying Boats, Many of Which Are in Use by the British Navy. The Machine Has Excellent Lifting Capacity and in Its Class Has Exceedingly Few Rivals. Some Authorities Contend That the Vessel with a Crew of Four Men can Take the Place of Three Cruisers for General Duty

The New Sturtevant Steel Seaplane, One of the Season's Interesting Craft Suited for Naval as Well as Sporting Purposes: It Rides on Two Floats and Holds Its Own on Fairly Rough Water. The Speed Range Is from 40 to 73 Miles an Hour. It Carries Two Passengers, Has a 140-Horsepower Motor, and a Wing Spread of Practically 50 Feet

The Picture Above Shows One of the Latest Wright-Martin Reconnaissance Tractors. Another Recent Wright-Martin Model is Designed for Long-Range Work and Is an Exceedingly Trim, Capable-Looking Tractor. The Wings are Slightly Staggered and Dihedral. One of the Distinctive Features of This Machine Is That the Forward Section Holding the Motor Is Detachable. The Landing Gear, Which is Patterned to Reduce Head Resistance, Has a Wide Tread and is Supplied with Shock Absorbers. Large Ailerons are Fixed to the Trailing Edge of the Wings

Testing the Wing Panels of One of Our "Frail Little Flying Boats." Sixty Persons are Shown on the Planes, Which a Few Minutes Before were Subjected to a Load of Sand Bags Weighing 20,000 Pounds. In View of This Graphic Illustration of Strength, the Popular Expression, "Fragile Air Craft," Seems Quite Out of Place

tried out in this country. Flying vessels of supposedly similar construction and designed to transport a useful load of about 10 tons are now in the course of construction.

In other ways, aside from triplane construction, radical tendencies in designing are evident in some of the late models. The Lawrence airplane, a new combination land and water craft just announced, in many respects is a striking innovation. In flight, a side view of it is not unlike a thick-bodied winged fish. It is a tractor biplane that is inherently stable and noncapsizable. The fuselage is inclosed so that both the pilot and passengers are completely protected and do not need to wear goggles. As soon as the vehicle takes to the air from the ground, the landing chassis is drawn into the body, thus removing a source of drag. Safety and simplicity of control have been the major considerations of the designers, and these with other attributes, such as the ability to ascend or descend at slow speed, adapt the craft remarkably for private cruising. Two models are being produced, one with three seats and the other with facilities for seven persons. Stop-watch tests have demonstrated that the machine can leave the water from a standing start in five seconds. An experimental craft with a 45-hp. motor has attained a speed of 75 miles an hour. Both of these records are significant, since 150-hp. engines are being installed as standard equipment. While particularly attractive as sporting craft, the Lawrence machines are expected to compete also for military honors.

Standard practice has been discarded and increased propulsive efficiency gained in producing the new Gallaudet machines, which combine the inherent advantages of both the pusher and tractor. Twin motors producing 300 hp. are mounted near the middle of the streamline fuselage, back of the places provided for the pilot and observer. Four propeller blades extend through a ring that separates the fore and aft portions of the body. The middle part of the propeller, which normally absorbs power without producing driving force, is inclosed within the fuselage. This unusual mounting conserves the power that is ordinarily wasted and advances the propulsive effect from 10 to 20 per cent. The combination has appealed strongly to the War and Navy departments, which have lately obtained biplanes and seaplanes of this type.

In the flying-boat class the "Super-America" type, which is an outgrowth of the "America" originally constructed for Lieutenant Porte's projected transatlantic flight in 1914, has proved a remarkable vessel. It has flown with as many as 16 persons aboard, and not long ago made an hour's flight with eight passengers. The British Admiralty has many of these machines in service, and the United States Navy, at present, one, which was "loaned" to it as a gift. From tip to tip the upper plane measures 80 ft. The power plant consists of two 160-hp. motors that give the craft a speed of 90 miles an hour.

The inherent stability of the Burgess-Dunne machines, which prevent them from stalling, side-slipping, or diving, has always given them particular favor in navy aeronautic circles. Therefore much interest has been shown in the new reconnaissance seaplane, which was completed in time for the Pan-American Aeronautic Exposition. The body, which extends ahead of the planes, is designed so that the pilot and observer sit side by side. The wings are of the same span, 46½ ft., are staggered 2 ft. 8 in., and are fitted with ailerons of equal area. The purpose of this model is to meet the demand for vessels capable of ascending and descending at slow speed while carrying a large load. The motor develops 140 hp. and drives a pusher propeller.

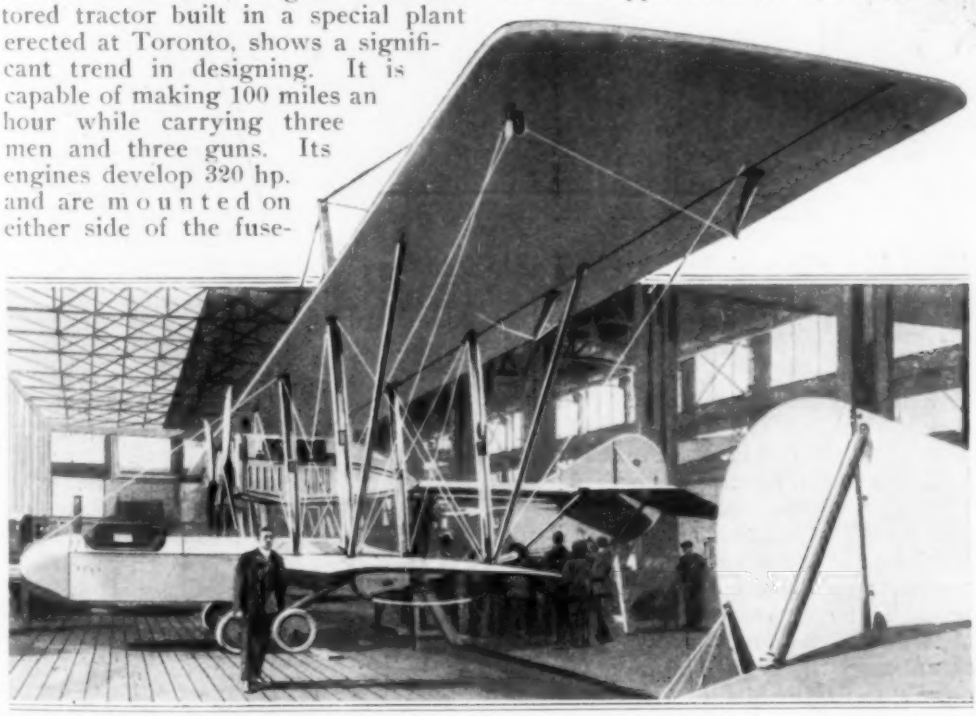
Steel enters largely into the construction of the new Sturtevant seaplane, a tractor biplane of trim, stanch appearance. The body, control surfaces, struts, and wing spars are metal. The speed range is from 40 to 73 miles an hour. Steel also is used in the body of the new Benoist cross-country plane,

which seems well adapted for sportsmen. It is equipped with a 100-hp. motor that gives a speed range of from 40 to 60 miles with pilot, passenger, four hours' fuel, and 100 lb. of luggage.

In military circles considerable interest has been manifested in late announcements of new models in Wright-Martin and Thomas reconnaissance biplanes. Both are tractors of fleet design intended for the army aviation service. The former is especially built for long-range work. Its planes have a spread of about 40 ft., with large ailerons attached to the trailing edges. They are set at a slight angle and staggered. With pilot, passenger, luggage, and six hours' fuel, the craft weighs about 2,630 lb. In the new Thomas, which has a 135-hp. motor, the exhaust passes to the top of the plane instead of over the side of the body.

Of battleplanes there are several that command attention, and among them two or three Curtiss machines. Of the latter the "Canada," a giant twin-motored tractor built in a special plant erected at Toronto, shows a significant trend in designing. It is capable of making 100 miles an hour while carrying three men and three guns. Its engines develop 320 hp. and are mounted on either side of the fuselage and well above it, as in the case of the Curtiss twin battleplane. The body extends far in front, so that the airmen have the same advantage of unobstructed vision that a pusher craft offers. The great size and weight of the machine makes necessary a four-wheel landing chassis. Large ailerons fit the trailing edge at either end of the upper plane, which in both machines is considerably greater in span than the lower one. In California a battleplane of 72-ft. spread, propelled by two 120-hp. motors, and fitted with biplane ailerons, has been constructed.

Although there are several foreign machines that outdistance all American craft in speed and climbing ability, our aeronautic progress during the past year has been nothing short of astonishing. That the near future holds surprises, and big ones too, is self-evident. These, however, are to be expected as a result of thorough adherence to engineering principles rather than the application of radical ideas.



COURTESY OF FLYING

One of the Prodigious "Canada" Battleplanes Designed to Fly with Three Men and Three Guns at a Speed of 100 or More Miles an Hour: It is Equipped with Two 160-Horsepower Motors and a Four-Wheel Landing Chassis

LARGE GARAGE IN BUSINESS DISTRICT OF CITY

Increasing traffic congestion in most large cities is making necessary the enforcement of strict regulations governing the parking of motor cars in business thoroughfares. This in turn is presenting a problem to the man who drives an automobile to and from his office daily. In Chicago, where street congestion is especially troublesome, this two-phase riddle has lately brought about the establishment in the loop district of a large garage within easy access of office buildings, hotels, theaters, and the shopping zone. It offers daytime parking space for several hundred pleasure cars, storage room for commercial vehicles at night, and garage facilities at all times for machines owned by permanent and temporary residents of down-town hotels. The basement and six floors of a fair-sized building are used. The arrangement is such that a patron has merely to drive his automobile into the garage through one of the front entrances, receive a claim check, and depart. Attendants take care of the machine, washing it, filling the gas and oil tanks, or making repairs, if so ordered. The car is delivered by elevator to one of the rear exits a minute or so after the owner calls for it in the evening. Telautographic connections between the cashier's office and the various floors permit the speedy transmission of orders. The facilities provide for the delivery of two cars a minute to the ground floor.

By Means of Telautographic Connections, Orders are Transmitted to the Various Floors without Delay. Only a Moment or So is Consumed in Delivering a Car After Its Owner Presents a Claim Check

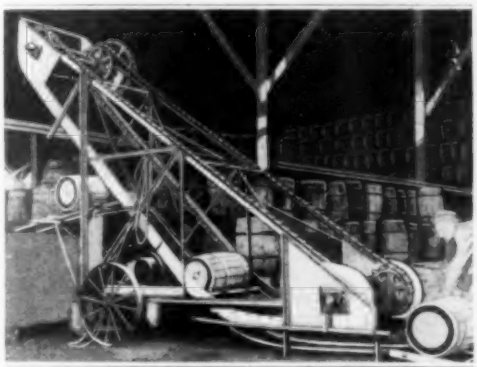
SMOKE "GUN" SAVES SHIP FROM SUBMARINE

Equipped with a new device invented by British chemists and engineers for concealing ships by a cloud of heavy black smoke, the big Glasgow freighter "Lakonia" arrived at Baltimore recently with a tale of thrilling escape from a German submarine by the successful operation of the smoke "gun," as the captain called it. All that appeared above deck was a funnel structure resembling a ship's ventilator, the rest of the apparatus being described as a large copper vat below decks, into which certain smoke-producing chemicals are slowly run and mixed, and a fan which blows the resulting smoke out horizontally through the funnel on deck. The heavy smoke screen thus produced rises very slowly from the surface of the sea, effectually hides the vessel from sight of an enemy, and enables it to change its course unobserved. A small quantity of the chemicals is said to make a tremendous amount of smoke, but tanks containing over 1,000 gal. were carried by the "Lakonia." The members of the crew were equipped with smoke helmets in case of need. The

smoke machine is used on several other vessels, including the White Star liner "Baltic" and the Cunarder "Carmania."

BARREL-LOADING MACHINE DOES WORK OF MANY MEN

A portable machine that can load 500-lb. barrels into a railroad car at the rate of 180 per hour, is one of the latest devices for handling freight economically. Its steel framework is set at an inclined position and supports an endless conveyor, driven by a 2-hp. motor. One man is employed in rolling barrels up to the elevator and a second guides the barrels into the car as they are discharged onto a platform level with the car door. Being mounted on



Portable Machine Equipped with a Two-Horsepower Motor, Which will Elevate 500-Pound Barrels to a Car Door at the Rate of 180 per Hour. Two Men are Required to Operate It

wheels and provided with suitable handles, the machine can be easily moved about on a shipping platform or in a warehouse.

MOTORCYCLE USED TO RUN LAWN MOWER

That new uses for motorcycles are still being discovered is shown by the fact that a Californian with a big lawn to care for, drives his mower with the aid of his powered cycle. After several unsuccessful attempts he devised satisfactory means of attaching the grass cutter to the front forks of his machine and now he asserts that he can trim the lawn in about one-tenth the time formerly required. The only consideration that limits his speed, apparently, is the fact that the mower

Californian Driving His Lawn Mower with a Motorcycle: By This Means He Is Able to Cut the Grass in a Fraction of the Time Formerly Required

must be oiled frequently. The front motorcycle wheel is so made that it can be detached very quickly and the substitution of the cutter is the work of only a minute or two. The trimming of the edges of the lawn has to be done by hand in the usual way.

GAS MASK FOR HAZARDOUS OCCUPATIONS

An air-tight face mask, provided with suitable valves and connected with a long air-tight tubing reinforced with wire, constitutes the outfit now being furnished by gas companies and other corporations to employes whose tasks place them in danger of asphyxiation. The mask can be inflated at its edge, so that it fits snugly against the face. An inlet valve permits the wearer to draw pure air from the pipe into his mouth or nostrils, while an outlet valve provides for expelling the breath directly into the room. The protector weighs only seven ounces and can be put on or off as easily as a baseball mask. The tubing may be had in various lengths.

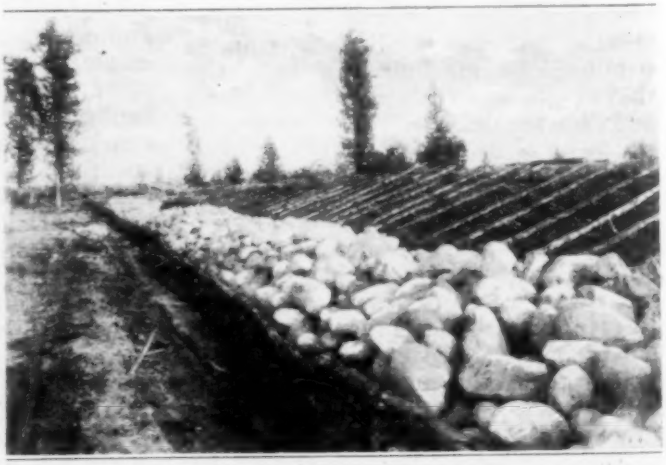
REALISTIC "SUBWAY" BUILT IN MOVIE STUDIO

The ingenuity of the stage carpenters and scenery artists employed by an eastern motion-picture concern was well illustrated recently in their reproduction of a New York subway station. One of the scenes of a play being produced included the sequel of a subway collision, and since a real underground railway could not be used for the setting, a station with its tiled walls and a section of the track were built in the studio. The crushed stone on the roadbed, the posters on the walls, and an automatic weighing scale, all helped to make the scene appear remarkably real. From what was supposed to be the mouth of the tunnel issued a cloud of smoke. Several days were required to build the "subway," though it occupied but a very small part of the play.

A Movie Scene—Not an Accident at All: What Appears to Be a Subway Station Is the Clever Work of Stage Carpenters and Artists in a Motion-Picture Studio. A Cloud of Smoke Conceals What is Supposed to Be the Mouth of the Tunnel

GLACIER BREAKWATERS ON LAND IN ALASKA

To prevent damage to agricultural lands in Alaska from floods caused by the melting of glacier ice in warm weather, it is sometimes necessary to build breakwaters on land. Though they serve the purpose, these are usually crude affairs, built of brush, poles, earth, and stone, bowlders being piled along the base to give the structure weight, so that it will not be carried away by the glacier waters and seepings from the ice packs. The form of construction is similar to that of marine breakwaters, broad at the base and narrowing toward the top. The land thus protected is usually very rich, with great possibilities for farming purposes. Its fertility is often a welcome surprise to new settlers.



An Alaskan Inland Breakwater, for the Protection of Farming Lands from a Deluge of Glacier Waters: Such Breakwaters are Constructed by the Government for the Benefit of Settlers

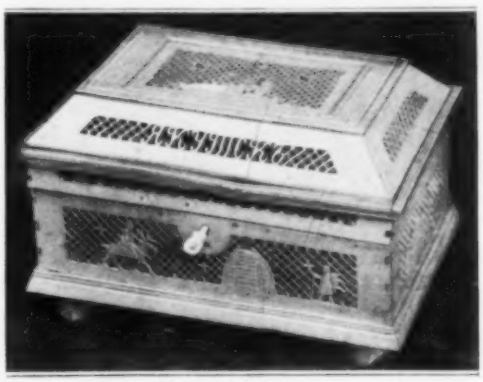
Wild Mountain Sheep Tamed by Famine: Excessive Snows Covered Up Their Food and Forced Them Down into Inhabited Regions. Humane Citizens of Ouray, Colorado, Provided This Flock with Hay

FAMINE TAMES FLOCKS OF MOUNTAIN SHEEP

Impending famine during the past winter temporarily overcame the wild nature of flocks of mountain sheep to be found in sparsely settled regions of Colorado, and brought them down close to human habitations. Their distress was caused by the excessive snows which covered up all the vegetation on which they browsed. The Colorado law forbids at all times the killing of mountain sheep, but in spite of this protection they are seldom seen at close range. A few months ago people in the mining town of Ouray, Colo., discovered that the flocks were near starvation and raised money to feed them. Hay was purchased and scattered within a few rods of the railway station, and the famished animals came and ate it, apparently without fear, as the unusual photograph shown herewith indicates.

SIBERIAN JEWEL BOX OF FOSSIL IVORY

A curious specimen of primitive art work has been on exhibition in the Museum of Natural History, New York, in the form of a large jewel box of fossil ivory which was made by natives of Siberia. The sides and top are composed of flat pieces of ivory, elaborately carved and carefully fitted together, the corners being dovetailed. Incorporated in the geometric openwork patterns are scenes suggestive of the northland, that on the front representing two hunters returning home, one riding a reindeer. The material from which the box is made is obtained from the tusks of mammoths that have been buried for ages beneath the ice

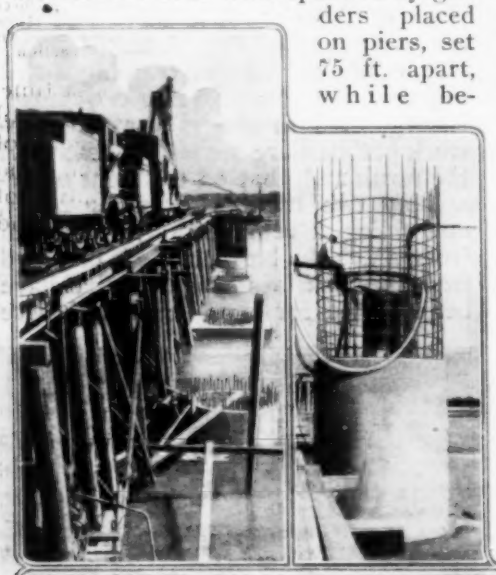


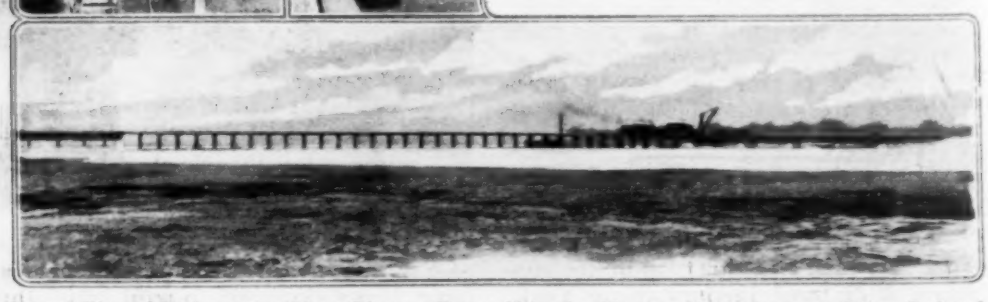
Carved Jewel Box Made by Natives of Siberia from the Tusks of Mammoths Which They Exhume in the Frozen North

of Siberia. Natives frequently go on long expeditions in search of these huge tusks, some of which weigh 200 or 300 lb. each.

LONG BRIDGE HAS TRESTLE IN CENTER

A bridge has recently been completed by the Burlington Railroad across the Platte River at Yutan, Neb., which has girders at either end, while the center is trestlework. At Yutan the stream often overflows, becoming over half a mile wide, and in winter destructive ice jams have formed on it. With a view to providing a bridge strong enough to resist the ice and yet not excessive in cost, the width of the Platte was decreased at this point from 2,000 ft. to about 1,380 ft. by building an embankment on one side. This intensified the two currents that flowed near the two banks and automatically deepened their channels, so that the ice was more easily carried off in spring. The two current beds were spanned by girders placed on piers, set 75 ft. apart, while between these was built a trestle 700 ft. long. This rather unusual handling of the problem made it possible to construct the bridge, which is 1,383 ft. long, for $125,000. It was found impracticable in building the caissons for the piers to keep them open at the top, so they were capped and the work carried on under compressed air. Concrete was supplied from a train that ran out on a temporary bridge, which also served as a base from which the girders were handled.



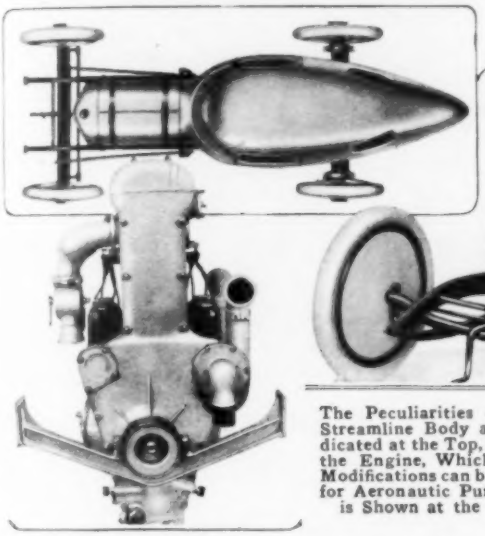


General View of Bridge across Platte River at Yutan, Nebraska, Showing Girder Spans at Either End and 700 Feet of Trestle in the Center. Above, Left, Temporary Bridge from Which Material was Supplied for the Construction of Concrete Piers; Right, Pneumatic Caisson in Operation, Showing the Pipe through Which Sand and Dirt is Forced Up from Below

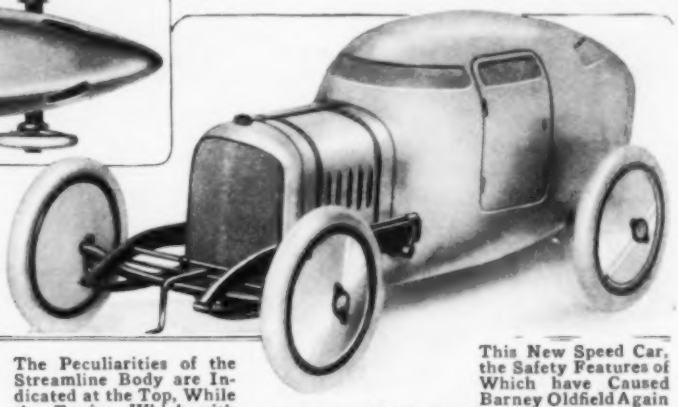
NEW AMERICAN RACING CAR HOLDS MUCH PROMISE

During the coming season a surprising American racing car will be entered in the foremost speed events and piloted by Barney Oldfield. So far as practical considerations have permitted, all efforts have been made, in designing the body, to reduce air resistance. The result closely approaches the ideal in streamline and makes the racer distinctive in appearance. Exposed parts, such as the front axle, tie rod, and starting-crank support, are individually streamlined. Back of the motor, the entire chassis, frame, springs, and all, is covered. Entrance to the body, which is completely inclosed, is gained through large doors provided on either side. Practically unobstructed vision in every direction is afforded the driver and mechanician by narrow, elongated openings screened and so placed as not to per-

mit an objectionable draft to sweep through the interior. The compartment is heavily upholstered with tufted hair and leather to protect the occupants in case of a spill. Consistent lightness was aimed at throughout, and the car, although powered with a 139-hp. motor, weighs under 1,800 pounds. A speed of three miles a minute is hoped for.



The Peculiarities of the Streamline Body are Indicated at the Top, While the Engine, Which with Modifications can be Used for Aeronautic Purposes, is Shown at the Left



This New Speed Car, the Safety Features of Which have Caused Barney Oldfield Again to Enter the Racing Game, is Expected to Be Capable of Making Approximately Three Miles a Minute. There Is Some Question, However, Whether the Car, Because of Its Lightness, will Get Sufficient Traction

DEVELOPMENT OF RUSSIAN WATER POWER PLANNED

One of the evidences of Russia's increased interest in her natural resources is the proposal that the government take over many of the empire's wonderful waterfalls and develop them for power purposes. In fact, the state has already expropriated the Little Imatra Falls in Finland, and for some time fairly detailed plans have been prepared for the transmission of power from the Great Imatra Falls to Petrograd. It is estimated that these two cataracts, in connection with the neighboring rapids, could be made to produce so much power that sufficient current could be transmitted to the Russian capital to effect an annual saving of 3,000,000 tons of coal. The cost of the current, it is estimated, would be quite low.

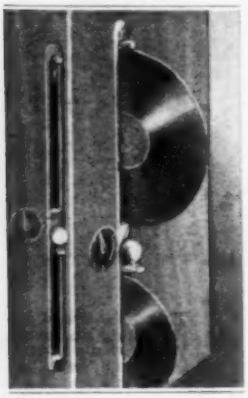
OFFICIAL FLAG ADOPTED BY STATE OF ILLINOIS

When the Illinois legislature met in January, a new state flag of authorized design was exhibited for the first time. The flag was inspired by the action of a Galesburg woman, state regent of the Daughters of the Revolution, who began an agitation for the adoption of a state banner five years ago and finally secured an act of the legislature authorizing the flag. The design selected was one of 35 submitted to a committee headed by the secretary of state, and consists mainly of the Illinois coat of arms on a white ground, bordered with gold fringe.

The First Illinois State Flag: Five Feet by Three in Size and Made of White Taffeta with Gold Fringe; the State Coat of Arms in the Center

MECHANICAL CABINET FOR PHONOGRAPH RECORDS

In a cabinet for phonograph records of the disk type, a young Chicago inventor has provided a turntable device with separate pockets for the records, which are delivered to the hand mechanically, as required. All the records being first numbered and listed, any particular one may be withdrawn from the cabinet for use by setting an indicator at the number it bears on the list and then pushing a spring. This causes the inclosed turntable to revolve, and the record wanted slides out through a narrow felt-lined opening into one's hand, dusted and ready for use. The cabinet is made with either a single or a double container, one compartment being set over the other in the latter case, to increase the capacity for holding records. The delivering device is said to operate equally well in either form.

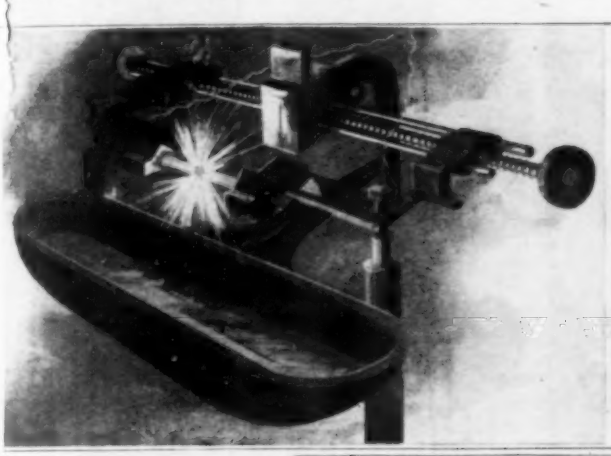


AUTOMOBILE BUS FOR OREGON RAILWAY

A 30-passenger automobile bus, that runs on standard railway tracks through power derived from gasoline or distillate, has been added to the equipment of the Mt. Hood Railway, a short line running from Hood River, Ore., to Parkdale, a small town near the base of Mt. Hood. An uncommon feature of the bus is that the front end is supported by a truck having four small wheels. The flanged tires of all the wheels are demountable. The entrance to the car is at the side, near the front. In the place of windows are curtains that roll up and are provided with oval openings covered with transparent material. The car will be employed largely in carrying passengers to the foot of Mt. Hood, which each year attracts an increasing number of tourists.

Thirty-Passenger Auto Bus, with Four-Wheel Truck in Front, Built to Run on a Standard Railway Track in the Hood River Region in Oregon

NEW RAYS OF GREAT VALUE IN CURE OF WOUNDS



Apparatus Used to Produce the Simpson Rays, Showing the Tray Which Catches Particles Thrown Off by the Lamp

Applying the S-Rays to a War Patient, Who at the Same Time Inhales the Beneficial Fumes Arising from the Light

FROM THE SPHERE, LONDON
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Lamp and Reflector to Focus S-Rays upon a Wound or Diseased Area to be Treated: Many Bad Cases of War Wounds have been Treated Successfully with This New Light, Discovered by an English Engineer

Many hospital cases arising from the great war, including shrapnel wounds and deeply seated chronic affections, have been successfully treated in recent months by what is known as the Simpson light, or "S-rays," so called after the discoverer, an English engineer. Their efficacy in the cure of wounds was discovered while he was experimenting on the affinity of rare metals for one another. Finding that the light produced in electric treatment of certain ores had curative effects upon the hands, he made electrodes of wolframite, the chief ore of tungsten, which produce the S-rays when placed in an arc lamp with a current of 40 to 50 volts and 5 to 8 amperes. Tested in the worst cases of wounds, it has been found that they improve at once when subjected to the rays with special apparatus for the purpose. The exposure required is unusually short and there seems to be a wide field for the use of the light for medical purposes. Many European hospitals now use S-rays.

GREAT BRANCH TELEPHONE EXCHANGE FOR HOTEL

A contract was recently signed for the installation of the largest private-exchange telephone system in the world. This will be located in a new hotel which is to occupy an entire block in New York City and will take rank as the world's largest hostelry. It was necessary to plan the telephone system in advance, as the service to be rendered is greater than that in the whole kingdom of Greece, with its mainland and island territory and equal to the requirements of a progressive American city with 20,000 population. The main switchboard will be equipped to serve 2,400 extension stations, and is to be erected in a penthouse on the roof of the hotel. Four other switchboards will be needed.

PHOTOS COPYRIGHT INTERNATIONAL FILM SERVICE

THE remarkable scene depicted in the above photograph was presented outside the Capitol in Washington at noon on March 5, 1917, when President Wilson was publicly sworn in for his second term. It was a solemn and memorable occasion because of the impending peril of war with Germany. The president devoted his inaugural address to our international relations, and his words echoed around the world. Above, at the left, is a photograph of women completing the new president's flag, unfurled for the first time at the inauguration. At the right is one of the completed flags; the ground is blue, with a white star in each corner.

INAUGURATING A PRESIDENT AS WAR THREATENS

President Wilson on His Way to Take the Oath of Office for Four Years More: He was More Strongly Guarded for the Trip from the White House to the Capitol and Back than Any Former President has Ever Been. Around His Carriage are Seen Some of the 32 Secret-Service Men Who, with Mounted Troops, Formed His Escort. At the Left Is an Army Auto with a Machine Gun Which was Demounted in Front of the Inauguration Platform during the Ceremonies—an Unusual Sight Which Deeply Impressed Spectators

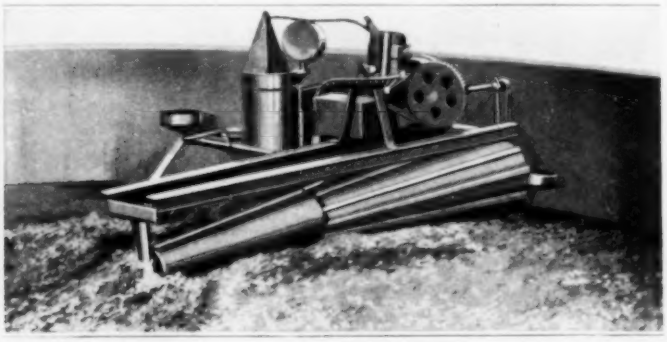
APPARATUS SEPARATES ICE BLOCKS FROZEN TOGETHER

To facilitate the separation of ice cakes that have become frozen together during a long period of storage, an eastern inventor has developed a cutting machine that is reported to accomplish the work of eight men, in addition to eliminating much waste. A motor driving a spiral saw-tooth milling cutter at the rate of 1,850 revolutions a minute is secured to an adjustable base mounted on a pair of runners, to the opposite ends of which plow handles are attached. When ready to start working, the motor and cutter are in a horizontal position. A lever swings them to the vertical, so that the cutter digs its way into the ice. By then pushing the apparatus, a seam may be followed readily. The cutting member may be raised or lowered so as to cut to a specified depth.

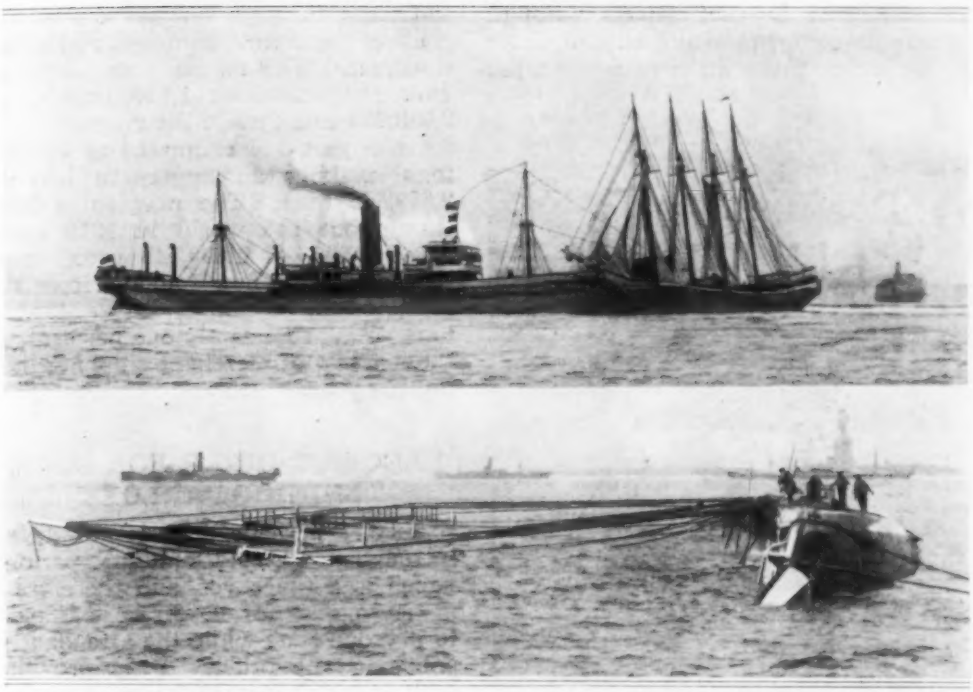
The Motor-Driven Cutter is Held in a Vertical Position so That It Is Possible to Cut along the Irregular Seams between Cakes of Ice That are Frozen Together

MACHINE PACKS SILAGE SO THAT LITTLE SPOILS

A machine for packing silage in a silo has been invented and tried out by an Iowa farmer. This mechanical packer does away with the disagreeable task of tramping the feed down with the feet. It also does the work much more satisfactorily, for the machine weighs a ton and is able to pack the silage close to the wall as thoroughly as in the center. The looseness of the material around the edges, which often results when silage is packed by tramping, is a source of considerable loss because the air gets into the fodder and causes it to spoil. This machine is equipped with a heavy cone-shaped roller whose length is about equal to half the diameter of a silo. It is driven in a circular course by a gasoline engine mounted on a supporting frame. The packer can be quickly knocked down into parts, few of which weigh more than 100 lb., so that they can be lowered down the silo chute.



Silage Packer Which is Driven by a Gasoline Engine and Packs Fodder so Thoroughly That There Is Little Loss from Spoiling



PHOTOS COPYRIGHT, INTERNATIONAL FILM SERVICE

Top, Schooner Rammed by Freighter in New York Harbor: The "Valeria" Crashing into the Side of the "Dustin G. Cressy," Which Sank as a Consequence of the Collision. Below, Salvaging the "Cressy," Which Went Down While the Crew was Trying to Beach It after the Accident. The Statue of Liberty Appears Faintly in the Distance at the Right

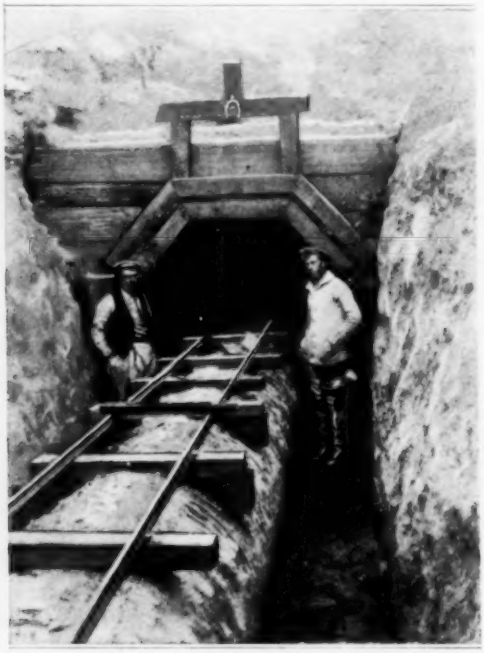
RAMMED SCHOONER SINKS IN NEW YORK HARBOR

Sudden disaster overtook the four-masted schooner "Dustin G. Cressy" a few weeks ago while making its way up the channel in New York Bay. The accident seems to have been caused by the sailing vessel suddenly veering from its course. A moment later there was a loud crash when the outbound freighter "Valeria" struck it a fatal blow on its right side. The injured schooner began to take water rapidly, but the captain hoped to be able to beach it and so save its valuable cargo, consisting of mahogany and other tropical woods. However, after drifting for some time the "Cressy" suddenly capsized and went down. The skipper and the crew of 12, who had plunged into the water, were all rescued by a tug. The sailing vessel sank in 60 ft. of water, and the work of salvaging it began shortly after. It was valued at between $150,000 and $200,000. Being uninjured by the collision, the "Valeria" continued on its way, having stopped only long enough to put out and then recall its lifeboats. It was laden chiefly with munitions.

TEMPORARY TRACK LAID ON A TUNNEL PIPE LINE

An ingenious method of clearing out accumulated débris from a series of tunnels through which runs a 36-in. water main was adopted recently at San Diego, Calif. As the pipe line occupies practically all the ground space in the tunnel, and there was a great deal of matter to be removed, the men in charge of the work laid a temporary track on the top of the pipe line and operated a small dump car over it. In this way a total length of 6,733 ft. of tunnel was cleaned out and made ready for necessary repairs and pipe renewals. The dirt and débris had

accumulated in the tunnels through improper drainage, which caused water from leaks in the main to rot out the



More than a Mile of Tunnels was Cleaned Out by the Aid of a Small Dump Car Run on This Track with Its Pipe-Line Roadbed

timbering and allow the earth from the sides of the tunnels to fall around the pipe.

WAR LOSS OF MERCHANT SHIPPING IN 1916

The net loss to the merchant shipping of the world in 1916, from all causes, including the war, was approximately one per cent of the whole, or about 500,000 tons, according to figures compiled by the Bureau of Navigation of the Department of Commerce. This reduction left the total of the world's merchant marine close to 48,200,000 tons on Feb. 1, 1917, when unrestricted submarine warfare was begun by Germany. In arriving at these conclusions, the tonnage of new ships built by the nations during the year was deducted from the combined totals of tonnage sunk or destroyed through war causes and losses sustained through normal causes, including shipwreck, collision, and abandonment. The actual war losses in 1916 are stated as 1,149 vessels, of 2,082,683 tons; while the normal losses for the year are estimated at 300,000 tons making an aggregate loss of 2,382,683 tons. The new ships built throughout the world in 1916 numbered 2,505, of 1,899,943 gross tons. Deducting this new tonnage from the total losses, as above, leaves 482,740 tons, or approximately one per cent, as the net loss of merchant shipping during the year.

ELECTRIC DRIER FOR SHOE-SHINING PARLORS

An electric shoe drier is now being introduced in shoe-shining parlors, which is a timesaver, and therefore a money-maker, for it can be employed to dry one shoe while the attendant is polishing the other. It is provided with a small motor-driven fan that forces a strong blast of air through a tubelike mouth directly onto the shoe. The drier is held in place by an iron arm that can be quickly attached to the foot rest. Current is obtained through a cord from any light socket. The little machine weighs only two pounds.

Drier Driven by Small Motor, Which can be Utilized to Dry One Shoe While the Other is being Polished

Grading Eggs with a New Candling Device That can be Used in a Lighted Room or Out of Doors, Doing Away with the Insanitary and Sight-Destroying Dark Room in Produce Houses: An Inclosed Electric Light Illuminates the Eggs

EGG CANDLER THAT NEEDS NO DARKENED ROOM

The old-fashioned dark room of the egg candler, familiar to packers and commission men for more than a generation, has been eliminated in many produce establishments in favor of a new type of egg candler, invented and marketed by an Indiana concern. With this device eggs are candled in the daylight, either indoors or outside, and the insanitary conditions that often prevailed in the dark room need no longer be endured. It is practically a miniature dark room in itself, consisting of a standard, a dark chamber with an aperture for the insertion of the eggs in a man's hand, an inclosed electric light, and a slanting eyepiece set at a convenient height for use when the operator is standing before it. The light may be furnished from a lighting circuit or from a battery attachment and the candler is made with either a single or a double eyepiece. A small size is made for country merchants, farmers, and hucksters.

FIRE-ALARM APPARATUS EXPLAINED TO PUBLIC

Doubtless a very large proportion of city dwellers know how to turn in a fire alarm, but probably only a very small number understand all that happens when one pulls the little lever that brings the fire company hurrying

Exhibition Booth in Cincinnati in Which Firemen Explained All the Workings of a Fire-Alarm Box and the Complicated Apparatus Connected with It

to the scene. Because Cincinnati officials believed that it was properly a part of a safety-first movement to give its citizens a better understanding of the workings of the fire department, a special exhibition booth was fitted up with a fire-alarm box and related apparatus. Firemen in the booth gave demonstrations to thousands of visitors, showing them the full operation of the fire-alarm system, and how the fire companies responded.

SANITARY VACUUM CLEANER OF A NEW TYPE

Among the new features of a sanitary vacuum cleaner of the stationary type, recently placed on the market, is

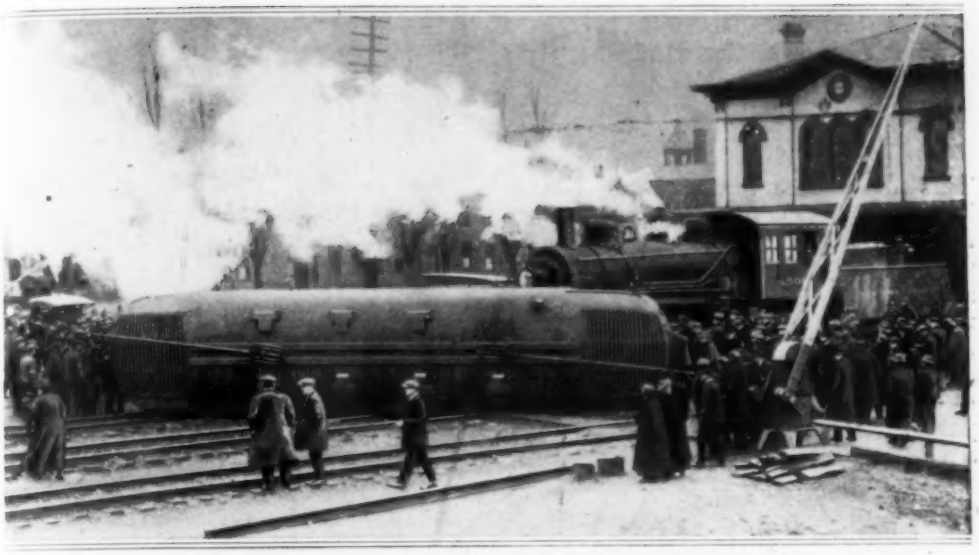
Stationary Vacuum Cleaner Which Washes the Dust from the Air as It Passes through the Rotary Separator Seen Above at the Left

a separator which disposes of the dirt automatically. As the dust-laden air, gathered by the floor tools, reaches the separator, it is washed by a spray of water. The dirt and water are then separated from the air by centrifugal force, exerted by means of the shape and construction of a small rotor, and are discharged directly into the sewer through a valve which opens just wide enough for this purpose. The machine is especially adapted, it is claimed, to complete the work of scrubbing rugs, carpets, and bare floors, thereby saving much of the usual labor on the knees, as it quickly removes the superfluous water.

VIBRATION OF PIANO WIRES SUSTAINED ELECTRICALLY

Many attempts have been made during the past 25 or 30 years to increase the sonorousness of the piano by devising means of prolonging the vibration of its strings. As is most evident, such a scheme has never been worked out to a commercially practicable point. Not many months ago, however, a new plan of sustaining piano notes was unfolded to the French Society of Civil Engineers and an instrument, equipped with a lately developed apparatus, demonstrated. Except for the fact that the invention gained the interest of scientific men at Paris, there is no immediate way of accurately estimating its actual importance.

In brief, each wire is controlled by two electromagnets connected in the same circuit. The major of these operates the string, while the other—which is an auxiliary exciter—governs the arm of a contact member which, with the piano wire, forms an interrupter. A spring tends at all times to throw the contact member against the wire, while the auxiliary magnet works in the opposite direction. The current travels from the main magnet to the secondary one, through the movable arm and contact piece to the piano string, and thence to its source. Thus, when the circuit is formed, the main magnet attracts the wire while the other one draws back the contact arm and interrupts the current. The piano string then vibrates while the auxiliary magnet releases the arm which, by the action of the spring, again forms a contact. This routine continues so long as current is applied, and a sustained note results. Means have been provided for neutralizing the possible vibrations of the contact arm, so as to avoid interference with the regularity of the circuit interruptions.



PASSENGERS ESCAPE DEATH WHEN ENGINE HITS CAR

ANOTHER demonstration of the superiority of steel cars over wooden ones, from the standpoint of safety, occurred in a spectacular way at Erie, Pa., a short time ago. The trolley of a local street car left the conductor wire at a railroad crossing, causing the carrier to stall in the path of an oncoming locomotive. Many persons were aboard the car when the engine, which was traveling 20 miles an hour, crashed into it. The traction car was overturned and pushed ahead a number of yards. Incredible as it seems, only one person was injured, and he but slightly. To assist the passengers in extricating themselves, a hole was cut in the car with an oxyacetylene torch.

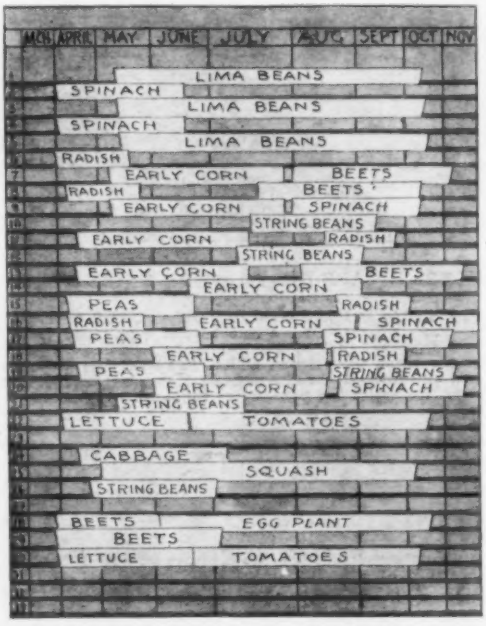
AS these words are written the President has called Congress to meet in extraordinary session. Before this page can reach our readers war with Germany will doubtless have been declared. Not a war of our choosing—not a war to enlarge our territory—but a war in defense of honor, justice, and the rights of humanity. Because as a nation we have not been given to a pyrotechnic display of patriotism some have blindly thought we had none. The spirit of Paul Revere is again abroad in the land and the response from every city, county, and farm is uniting in a stupendous potentiality. We undertake this mission with sadness but with that intensity of purpose that has made America what it is, in the hope that permanent peace for all the world may be our reward.

H. H. WINDSOR.

FOOD PREPAREDNESS THE NATION'S NEED

IT is becoming seriously apparent that Americans must marshal their energies and utilize their resources toward the production of food. With the civilized world at war, waste must be curtailed and supply increased. This means that unused ground must be worked. People in the cities are feeling the pressure of unprecedented prices. To combat actual want, it is imperative that they modify their system of living and become producers. Back yards, vacant lots, and unoccupied tracts of land in outlying districts are available for cultivation. National security demands that they be developed.

For two months the newspapers of the United States as well as certain local and national organizations have urged city garden plots. The campaign has not been for amusement or entertainment. Actual need has prompted it, the Department of Agriculture has encouraged it, and far-sighted persons have heeded it. In France, Germany, and England public parks are being plowed, forest land cleared, and vacant areas planted. And yet there is hunger. America with its vast territory can have plenty, but farming, both in the country and city, must be promoted in dead earnest.



This Chart is Designed to Enable the Amateur to Plan His Vegetable Garden so as to Get the Maximum Yield. Cardboard Strips Fit into Slots Representing Garden Rows, and by Their Lengths Show at a Glance How Long Each Product will Occupy the Space Devoted to It

In the cities the gardening movement cannot be left for the poor alone to carry out. Those who are in meager financial circumstances will be benefited most, of course, but the problem is food—quantities of it—and not solely what market prices will be. In the present emergency, food for the allies is as important as food for ourselves. It must be produced, and every back yard and every fertile lot made to thrive.

At Brooklyn, Philadelphia, Pittsburgh, Chicago, Minneapolis, Denver, Spokane, Los Angeles, Atlanta, Washington, and dozens of other metropolitan centers, gardening campaigns are being conducted. In these places hundreds of acres of ground heretofore abandoned to weeds and rubbish are being converted into gardens which, during the coming months, will add fresh, green touches to many neighborhoods and supply food for their cultivators. The importance of the city-farming agitation cannot be overestimated. Gardening this year is not a fad; it means family and national preparedness.

A concrete illustration of what can be done is furnished by what has been done at Chicago in past years through the endeavors of the City Gardens Association, a philanthropic organization. The body controls four tracts of ground in different parts of the city and divides them into plots an eighth of an acre in size. The little gardens are allotted to needy men and women who are enterprising. The soil is plowed, seed is supplied, the advice of scientific supervisors offered, for a charge of only $1.50. The rest of the expense is met by popular subscription.

TIMELY AMERICAN WAR PICTURES OF INTEREST

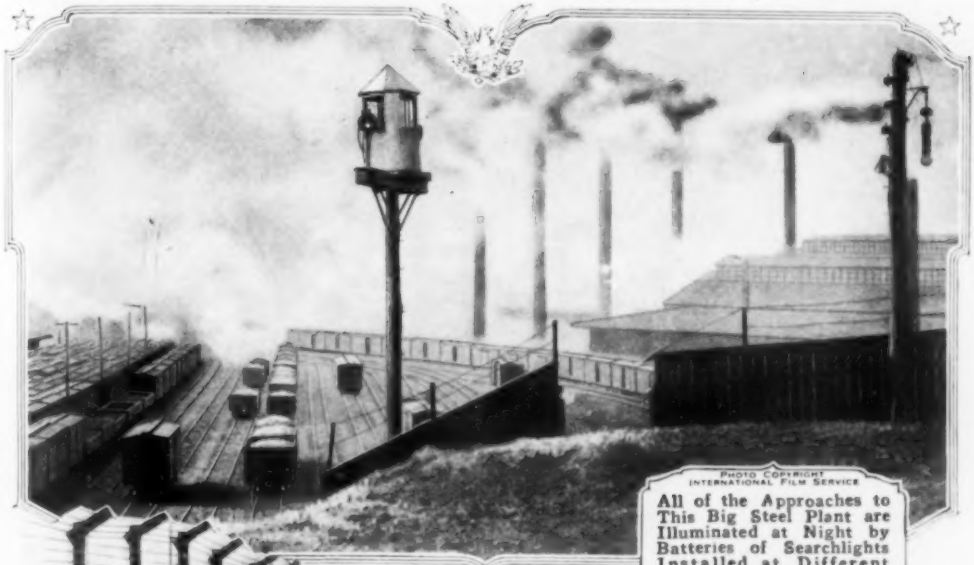


PHOTO COPYRIGHT INTERNATIONAL FILM SERVICE

All of the Approaches to This Big Steel Plant are Illuminated at Night by Batteries of Searchlights Installed at Different Points. In the Foreground of the Picture will be Noticed an Observation Tower Equipped with a High-Power Projector. In This Way a Constant Look-out for Spies and Incendiaries is Kept by Watchmen Who Are on Duty at All Times, Guarding the Bridges and Gates, and Patrolling Fences

PHOTO COPYRIGHT UNDERWOOD & UNDERWOOD

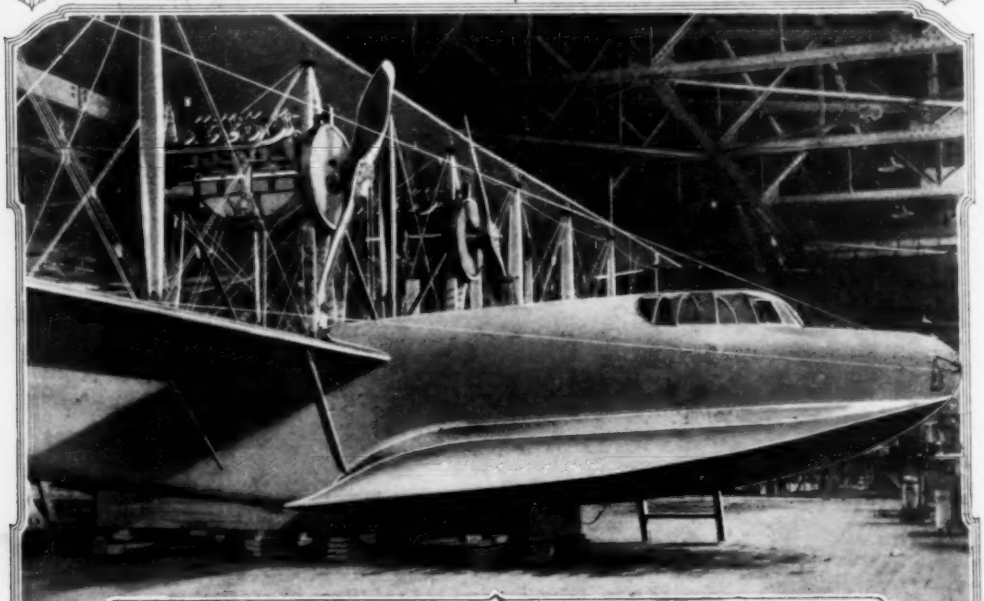
A Seven-Foot Barbed-Wire Fence Carrying a High-Voltage Current Surrounds the Big Federal Radio Station at San Diego. Sentries Are on Guard Night and Day, and Unless on Official Business and Properly Vouched For, No One is Permitted to Enter the Grounds

Dummy Rifles Mounted in Land "Turrets" are Used in Giving Naval Gunners Their Preparatory Training. The Pieces are Equipped with Standard Breech Mechanism and Loaded in the Usual Manner, so That the Men are Made Thoroughly Conversant with Conditions as They will be Found on Shipboard

OUR NEW BATTLE CRUISERS FOR LAND AND AIR

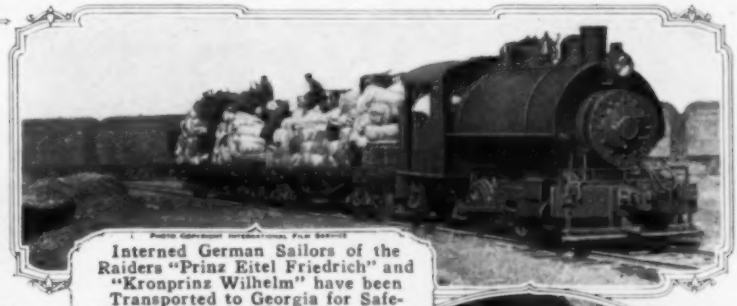
PHOTO COPYRIGHT, INTERNATIONAL FILM SERVICE

The Photograph Above was Taken near Los Angeles Lately during a Demonstration of an American-Built "Tank" Car, Similar to Those Used by the British on the Western Battle Front. The Machine was Put through a Series of Severe Tests before Officers of the United States Army. As It was Climbing Out of a River and Ascending a Steep Embankment, the Soft Earth Gave Way and Caused the Heavy Machine to Turn Turtle



Herewith is Pictured One of the Latest Additions to the United States Navy's Squadron of Flying Boats at Pensacola. The Vessel, One of the Biggest in Our Service, Mounts Two Motors That Together Develop 400 Horsepower and Drive the Craft at a Speed of About 85 Miles an Hour. The Design of the Hull Is an Interesting Feature of the New Boat. It will be Observed, Also, That a Transparent Windshield Protects the Occupants

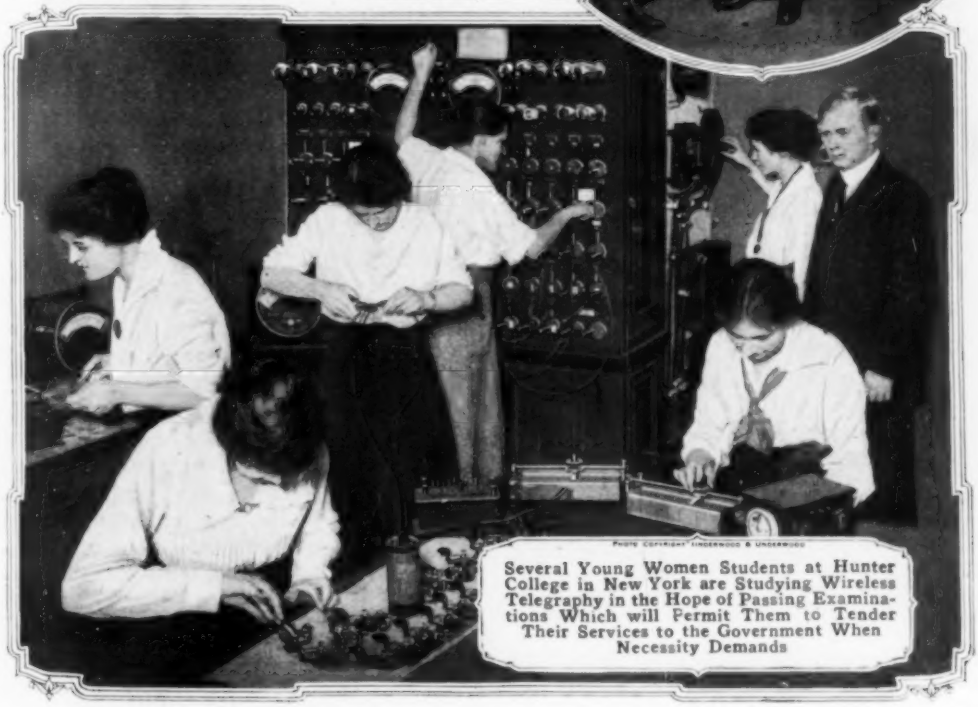
ELEVENTH-HOUR PREPAREDNESS SWEEPS COUNTRY



Interned German Sailors of the Raiders "Prinz Eitel Friedrich" and "Kronprinz Wilhelm" have been Transported to Georgia for Safe-Keeping. Above, Their Luggage is Shown on Flat Cars

The First Girl to Enlist in the Navy under the Recent Ruling Which Admits Women for Special Duties. As Chief Yeoman, This Girl has been Assigned to a Recruiting Station

The Girl Sailor is No Longer Confined to the Comic-Opera Stage: A Philadelphia Young Woman Taking the Oath of Allegiance to the Country and Flag, and Entering the Navy



Several Young Women Students at Hunter College in New York are Studying Wireless Telegraphy in the Hope of Passing Examinations Which will Permit Them to Tender Their Services to the Government When Necessity Demands

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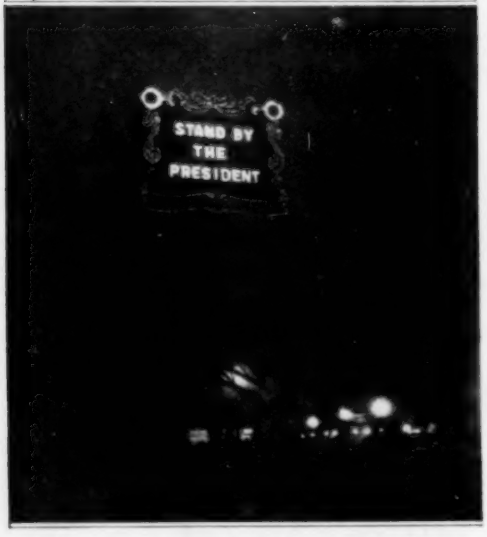
BRIDGE COLLAPSES BENEATH WEIGHT OF TRAIN

TWENTY or more persons, the majority of them soldiers, were killed some time ago in a spectacular wreck that occurred on the Hankow-Peking Railway in China. A long steel bridge spanning one of the streams along the route gave way beneath the strain of a military train that was loaded with provisions. All but one of the cars were hurled into the river, which at the time was shallow. The rolling stock was demolished, but much of the foodstuff was recovered by coolies and carried ashore.

ELECTRIC SIGN USED FOR A PATRIOTIC PURPOSE

During the international crisis a few weeks ago, when patriotic men and women were rallying to the support of the president, regardless of party, an electric-power company in Washington, D. C., devoted a large electric sign, usually used for advertising its own service, to the patriotic purpose of writing across the darkness in letters of light the timely message, "Stand by the President!"



This Sign on Pennsylvania Avenue, Washington, Was a Patriotic Contribution by a Power Company during the Recent Crisis

AMERICAN CUTLERY TO BE MADE OF RUSTLESS STEEL

Steel made by a rather recently discovered English process, which is said to render it rustless and nontarnishing, is to be used in the manufacture of American table cutlery, according to reports. Plated steel knives are more widely used in this country than in many parts of Europe because Americans object to the tarnishing of ordinary steel blades. It is thought that there will be a large demand for the new tableware because it will not have this undesirable feature and it will be capable of taking a sharp edge.

NEW RAY DESTROYS ZEPPELINS

By FRANK O'CALLAGHAN, M. Sc.

IN December of last year, Popular Mechanics Magazine published an article by Lewis R. Freeman describing the destruction of Zeppelins attempting raids on England. The article was badly mutilated by the British censor and one paragraph was deleted at the most interesting point, where probably Mr. Freeman told how the big airships were brought down. Prizes were offered for the two best paragraphs replacing the censored one. The contest excited widespread interest. The winning paragraphs were published in the March, 1917, magazine. It is this contest to which Mr. O'Callaghan here refers. Mr. Freeman is still abroad, on the Italian front at present, and not at liberty to reveal what he had said in the deleted paragraph. In view of the revelations made by Mr. O'Callaghan in the accompanying article, written early in March, Mr. Freeman's statements will be awaited with intensified interest.—Editor.

TEN days ago I arrived in New York City from Liverpool (my first visit to America) and, reading through the March number of Popular Mechanics Magazine, was immediately interested in the article entitled "What Did the Censor Cut?"

The theories therein advanced by the prize winners in explanation of the failure of the raid over London struck me as ingenious but nevertheless erroneous in the light of information which is in the possession of a few people, including myself, concerning the researches of a young Belfastman, Alexander Corr.

About a year ago a sensation was produced in Ireland by an announcement in the press that a young student of the Hardinge Street Christian Brothers School, Belfast, Alexander Corr, had, whilst experimenting in his own home, discovered a new aniline dye, and for this reason, and other services, had been awarded by the British government an annual payment of £3,000 ($15,000 approximately) and a permanent scientific post of importance in London where he could continue his researches.

Owing to a series of defective systems of education, Ireland does not produce many research students of the first class, and the general astonishment produced by the announcement was augmented by the fact that this important discovery in a difficult field of organic chemistry was made by one so young.

Whilst in Belfast, I had taught, at Skerry's College, several students of the Hardinge Street School and knew that it differed from other Irish schools in ignoring the intermediate examinations and aiming at giving a sound training in technical work, particularly engineering. It has well-equipped laboratories and a wireless installation, the latter, of course, now dismantled by order of the government. From schoolfellows of Corr I elicited the following information:

The boy was not a brilliant, but rather a hard-working, student. His discoveries were communicated to the British government by his sister, with no result. The Christian Brothers then interested themselves in the matter and accompanied Corr to London, where his demonstrations were approved as satisfactory by the War Office and Committee on Scientific Research.

The most remarkable part of the story is to come.

Corr was credited with having discovered a new ray by means of which Zeppelins could be destroyed. (Experts on science and aviation had maintained that this represented the only possible way of dealing effectively with Zeppelin raids over the coast defenses or the inland towns of England where ordinarily the odds were all in favor of the raiders.) Wishing to test his discovery at home he pasted a sheet of paper on a window at the back of the house and standing with his apparatus at a distance of 10 feet from the window, directed the new radiation toward the sheet of paper. He expected to transmit sufficient energy to ignite the paper. Actually, the window was blown out and a wall at the end of the garden demolished.

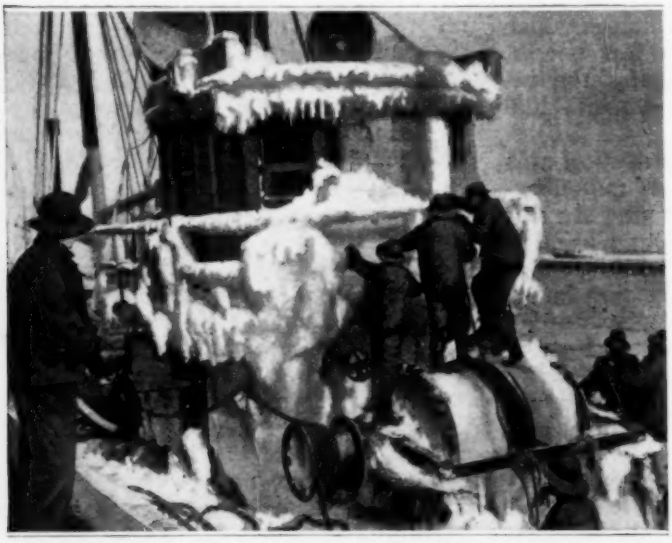
I confess that on hearing about the discovery I was inclined to take it with a grain of salt. However, all who heard the statement awaited future Zeppelin

raids over England with interest, as we were assured that the new apparatus was certain to be supplied to all aeroplanes and antiaircraft guns of the Royal Garrison Artillery. As is well known, in the two next attacks by airships the Germans lost one over London and two in a raid over the English midland counties, themselves admitting in their communiqués that the British antiaircraft defenses were "extraordinarily effective." Since then no air raid has taken place, and latest information from Germany indicates that the Zeppelins have lost the confidence of the experts as weapons of war.

From English officers in the Royal Garrison Artillery on visits to Dublin I have heard that it is current gossip in London military circles that the discovery of a young Irishman (presumably Corr) was responsible for the destruction of the Zeppelins.

ATLANTIC BOATS CRUSTED WITH ICE IN COLD SNAP

When the unusually bitter weather of last winter reached the north Atlantic coast it caught many vessels on the high seas in its grip and by the time they had made their way to port all their exposed surfaces were laden with a massive and picturesque armor of ice. Masts, rigging, hoisting machinery, lifeboats, decks, and deck rails all were covered with the frozen coating, and the steam trawlers arriving from the fishing grounds suffered especially from the cold snap which made navigation unusually difficult.



Ice-Incased Deck House of a Steam Trawler Arriving in Boston Harbor from the Fishing Grounds during the Coldest Weather That has been Known in the North Atlantic in Many Years

INTERLABORATORY TESTS OF LAMPS AND SCREENS

An interesting photometric comparison of blue-glass screens and of tungsten lamps was completed recently by a number of laboratories which had been invited by the United States Bureau of Standards to participate in the tests. One of the participating institutions was an electrical testing laboratory and another the physical laboratory of a gas-improvement company. The object was to see how closely these different agencies agreed in their estimates of the values of the screens and lamps submitted to them. Each laboratory was permitted to follow its own method. In spite of the differences in procedure the agreement between them was remarkably close. However, in commenting on the tests, the government bureau points out that while the differences were small they are not negligible in precision photometry, and therefore it maintains that measurements to establish standards involving color differences should be left as much as possible to the standardizing laboratory.

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Using a New Periscope Rifle, Designed for Trench Warfare: The Man Firing with the Improved Device is Completely Concealed, While the One at the Left Exposes His Head to Shoot. The Rifle Folds into Customary Shape, as Shown at the Right

ARMY RIFLE ADAPTED FOR TRENCH WARFARE

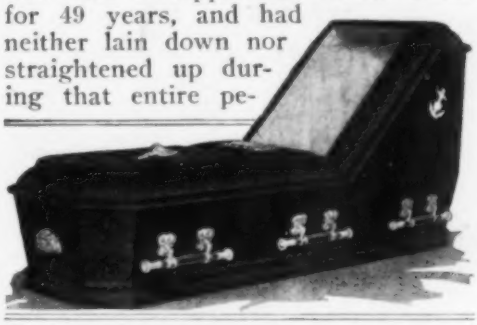
The Springfield army rifle may be made especially useful in trench warfare by the invention of two residents of Los Angeles, which consists of a periscope device adapted to the rifle so that it may be aimed accurately by a marksman entirely concealed in a trench. The device was demonstrated recently at the government rifle range, Beverly Hills, Calif., being tested with success at ranges of 200, 300, and 400 yd. At these distances, targets the size of a man's head were hit, while the marksman's head was a foot below the top of the trench from which he fired. A small framework of steel is built into the stock of the army rifle, with hinges that permit the breech and barrel to be raised and lowered at an angle to the stock, and means for locking the weapon rigidly in its new alinement. Behind the breech and in line with the regular sights, when the framework is open, there is a small periscope which gives a clear view to the marksman of the point at which the sights aim.

MAGNETIZED TABLE FOR ONE-ARMED DRAFTSMEN

In order that any draftsman or architect who has lost an arm in the war may not be forced out of his regular employment because of his misfortune, a drawing table has been introduced in Europe which is equipped with electromagnets that hold the T-square, triangles, and other materials securely in position, while lines are being drawn. The small amount of current for the magnets is derived from batteries or from an ordinary light socket, and is controlled entirely by a foot lever.

ODD-SHAPED CASKET FOR BODY OF A CRIPPLE

At the dying request of a man who had been a cripple from rheumatism for 49 years, and had neither lain down nor straightened up during that entire period, he was buried in the sitting posture in which his friends were accustomed to see him. A special casket was constructed by an Evansville, Ind., undertaker, one end being raised considerably above the level of the lid, with a sloping cover section, to receive the body in the position desired.



Casket Made to Receive Remains of a Cripple Who Desired to be Buried in a Sitting Position

¶The city of Cleveland now has a law which requires that when a resident moves he or she must file a report of the change of address with the police.

ELABORATE CAMP FOR FRENCH AMBULANCE DOGS

ONE of the interesting places near the front in northern France is the war-dog camp illustrated by the above photograph. Each one of the many stone kennels houses a trained dog used in the French ambulance service. After a battle the animals are sent out to assist in finding the wounded. When they can do so, they return with a kepi, handkerchief, or some other article of a fallen soldier's equipment, and then lead stretcher bearers to the spot. Otherwise they stand guard over their charges and call help by barking. Many pathetic stories are told of the untiring and valuable work done by some of these loyal animals. While the camp shown here is inhabited solely by ambulance dogs, others of similar character are maintained for those that aid in sentry and scouting work. When one of these was visited by Rudyard K'pling early in the war, a trainer described most enthusiastically the intelligence of a certain dog by exclaiming: "My fellow here knows the difference between the noise of our shells and the Boche shells."

SOME LATE DEVICES USED IN WARRING EUROPE

Photo Copyright International Film Service

Straddling an Abandoned Trench Somewhere on the Western Battle Front, One of the British Army's Spectacular "Tank" Cars, Crippled: Like Achilles' Heel, the Most Vulnerable Parts of These Machines Are the Treads, Which are Easily Disabled by Well-Directed Shell Fire. When One of the Belts is Broken, as Shown in the Picture Above, the Engine Becomes Helpless

Photo Copyright International Film Service

Designed Primarily for Campers and Overland Tourists, This Motor-Car Trailer is Successfully Used by the American Ambulance in France. It Is Standard Equipment Manufactured in This Country and Folds Compactly When Not in Use. Opened, as Shown Above, Its Beds Accommodate Four Persons

One of the Effective Weapons Used in Trench Warfare by the French Is the Bomb Thrower Pictured in Use Herewith. The Instrument Is Light, Easily Portable, and Electrically Operated. For Short-Range Work It Is Very Valuable

In Some of the British Military Hospitals Double-Decked Wheeled Stretchers of the Type Illustrated are being Commonly Used. They Are of Distinct Advantage, Since One Attendant can Propel Them without Assistance and Move Two Patients at a Time

EUROPEAN ARMY VIEWS FROM HERE AND THERE

Irish-Canadian Troops were Recently Given a Rousing Reception When They Visited the Principal Cities of the Emerald Isle. This Photograph Shows a Detachment of Them Marching in the Streets of Dublin. It is Reported That the Patriotism Stirred by These Well-Drilled Men Caused Many to Volunteer

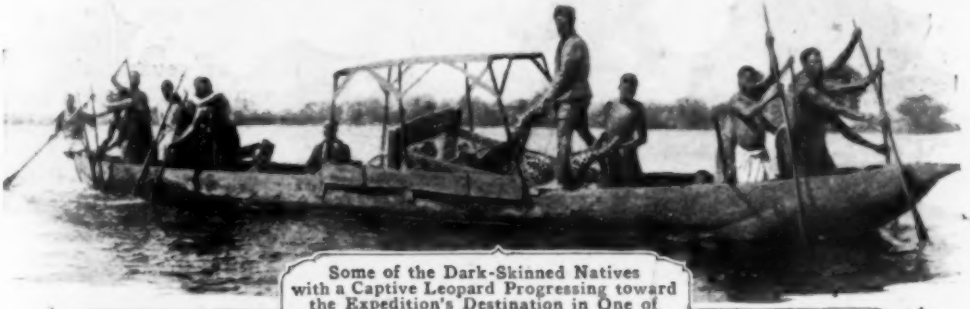
PHOTO COPYRIGHT INTERNATIONAL FILM SERVICE

Practically Every Regiment Has a Mascot of Some Sort, but It is Not Understood That Wild Boars are Usually Chosen. Here Is One, However, Captured When Young by Some French Soldiers, That Is Nearly as Tame as a Dog

With the United States Flag Aloft, the Woodrow Wilson Soldiers' Rest in Switzerland: The Camp has been Established and Presented to the Government for the Use of Soldiers, by Members of the American Colony. The Picture Shows Infantrymen Enjoying a Meal in the Open Air

STRIKING WAR PHASES PICTORIALLY TREATED

Natives Enlisted in the British Naval Expedition to Lake Tanganyika in Africa, Which was Undertaken in 1915 to Crush Germany's Power on That Body of Water, Proceeding across the Swamps of Lake Bangweolo. It will be Recalled That Two Small, Armed Motor Launches were Taken Overland through the Kongo to Battle German Gunboats on the Lake, and That the Latter were Sunk



Some of the Dark-Skinned Natives with a Captive Leopard Progressing toward the Expedition's Destination in One of Their Log Canoes: Twenty-Seven English Officers and Men Engineered the Undertaking, Which Involved Tremendous Obstacles and Hardships

PHOTO COPYRIGHT, UNDERWOOD & UNDERWOOD

It Is an Old Joke That Green Troops Duck Their Heads to Dodge the Bullets When First Introduced to the Firing Line. The Picture Above was Snapped Just as a German Shell Exploded near a Farm Building on the Western Front, and Shows a Group of Soldiers Dropping to the Ground in Order to Escape the Flying Splinters. This Practice, However, Is Not in the Same Category as the Other One, for It Is a Highly Advisable Thing to Do

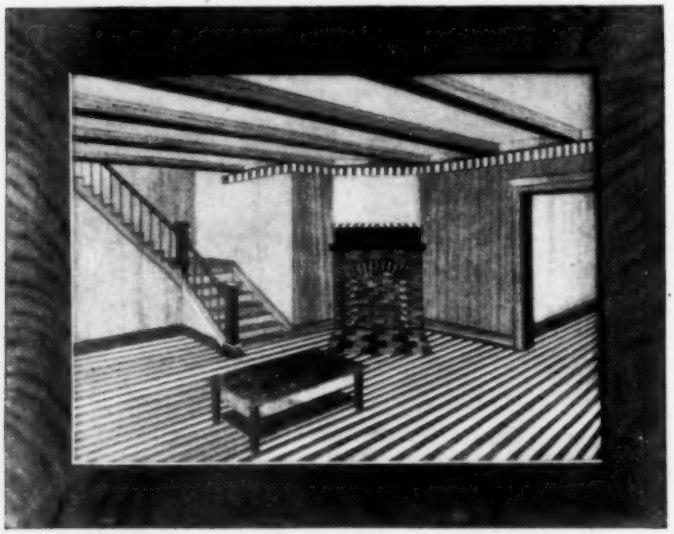
SMALL TRACTOR USED BY A TRUCK FARMER

A Kansas truck farmer recently suggested to a Topeka foundryman the design of a small lightweight tractor to take the place of a single horse in the cultivation of his strawberry fields, and the result was the construction of a practical and useful machine. Taking three light binder wheels, the foundryman made an iron frame for them, on which he mounted a single-cylinder gasoline engine of the heavy-duty type, with a sprocket-wheel attachment to the rear wheels, a fuel tank, and the necessary electrical equipment for ignition. A reserve fuel supply is carried on the front end of the frame and the tractor is steered and controlled from a saddle seat at the rear. It works satisfactorily, doing several times as much in a day as a horse could accomplish in the field.

Tractor Designed for the Cultivation of Strawberries

MANY RARE WOODS COMPOSE INLAID PICTURE

An Ohio architect has produced a picture, 16 by 22 in. including the frame, which is quite a remarkable work of art, in that it is made entirely of pieces of natural wood. The artist for years has been collecting specimens of rare and beautiful woods. Spanish mahogany, red cedar, and black walnut were combined in making the picture, which shows a residence interior and stairway. The library table shown is particularly beautiful, because of its harmonious and contrasting colors. The lowest newel post is composed of ebony, butternut, burl, English holly, and Honduras mahogany. There are nearly 300 pieces of wood in the fireplace, which is so made that it can be lighted from behind by an electric lamp. The picture reproduces a scene in an old Virginia home.



Framed Piece of Inlay Work Composed of Hundreds of Pieces of Rare and Beautiful Woods in Their Natural Colors, Reproducing a Scene in a Virginia Colonial Home

One of the Beautiful Clubhouses of the North Pacific Coast, the New $80,000 Home of the Waverley Club at Portland, Oregon. At the Left is Shown the Sixteenth Hole, Known to Waverley Players as the "Punch Bowl." Bunkers Guard the Approach and the Willamette River is Just beyond the Green. A Hook Carries the Ball into Trees and a Slice Sends It Out of Bounds. The Spot Is the Waterloo of Many Promising Scores

Delightful, Unconventional, and Hospitable Is the Rustic Lodge of the Tualatin Country Club, near Portland, Oregon, Where Fellowship and Golf Hold Sway. The Bungalow Fits Harmoniously into Its Setting and Is a Favorite Retreat for Many Lovers of the Outdoors. It Offers Inviting Accommodations for Hungry Sportsmen and Porches for Tired Ones

The Fifth Green on the Calgary Municipal Golf Links, a Course Situated on a Magnificent Promontory Overlooking the Canadian City and Bow River. An Annual Fee of $5 for Men and $3 for Women Pays the Running Expenses. The Land was Donated by the Government, and a Small Clubhouse was Erected Last Year Which will be Added To as Necessity Demands

Above Is the Picturesque Home of the Beaconsfield Golf Club, a Popular Rendezvous of Montreal Players. Its Early French-Canadian Architecture Gives It Atmosphere and Appeal, While Its Spaciousness Allows It to Give Hospitality to Many Guests. It Is One of the Largest Country Clubhouses in the Dominion. An Annex Reserved for Women is Connected to the Main Building by a Portico

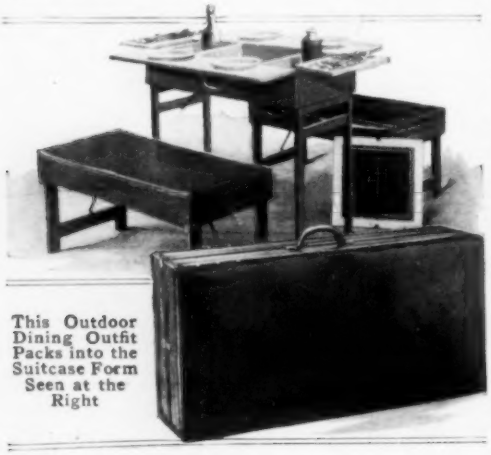
KANSAS RAILROAD SOLD AT PUBLIC AUCTION

All the property of the Missouri Pacific in the state of Kansas, known separately as the Kansas, Colorado & Pacific Railroad, was sold at public auction recently, under a plan of reorganization arranged by New York financiers. The sale itself was a mere formality, the property being bid in by representatives of the fiscal agents and trustees of the road at $9,800,000, the minimum price fixed by the Federal court which ordered the sale. The formal proceedings occurred outside the Missouri Pacific depot at Topeka, in zero weather, before a small crowd of spectators, some of whom did not realize that the sale marked the passing of the Gould family influence from the affairs of the railroad system it had dominated for many years. The reorganization plan provides for the consolidation of the Missouri Pacific and Iron Mountain railroads as one company, with a total capitalization of $383,824,000, under the presidency of one of the foremost railway men in America.

Scene at the Missouri Pacific Depot in Topeka, Kansas, When the Property of the Railroad in That State was Formally Sold to New York Financiers

COMPACT DINING OUTFIT FOR CAMP OR AUTO

A convenient outfit for motorists and campers who take their meals in the open has been designed by a resident of Portland, Ore. It comprises a folding table and two folding double seats, with interior compartments in the table for food and drink, dishes, towels, napery, and silverware. A checkerboard is inserted in the square covering of the food compartments. The whole outfit, including utensils, weighs less than 30 lb., much of the wood being veneer. When folded it takes the shape of a suitcase, 32 by 17 by 9 in., fitting on the running board of any auto. When unfolded the outside of the suitcase forms the camp seats, with legs kept rigidly upright by a single hook. The table fits inside the case and when similarly unfolded and fastened stands 30 in. high. Its top, unfolded, measures 32 by 46 inches.



This Outdoor Dining Outfit Packs into the Suitcase Form Seen at the Right

¶Two French inventors have devised a photographic color-printing process which is to be used in printing on silk. It has been adopted at the French government's Gobelin works.

RAISING RABBITS FOR FUR DECLARED UNPROFITABLE

That a widespread misconception concerning the value of rabbits as fur producers exists at present, is indicated by numerous inquiries received by the Department of Agriculture. Replies to these questions have stated that there is sufficient demand for rabbit fur to make it worth while to save pelts of domestic rabbits killed for food, but that the raising of rabbits for fur alone would be unprofitable with any known breed. Before the war Great Britain imported as many as 90,000,000 skins annually. The United States also uses large quantities of rabbit fur, making it into felt and cheap fur garments often sold under such names as "Baltic black fox," "inland seal," "electric seal," etc. The bulk of this fur is sold in bales bringing from 10 to 50 cents per pound. The better skins sell by the dozen, generally bringing less than 10 cents each. Statements to the effect that certain breeds produce pelts of high market value are entirely unwarranted, according to a statement issued by the department, which points out further that certain rabbits have been widely proclaimed as being imported from Siberia, in one case, and Mongolia, in another, while as a matter of fact no wild rabbits occur in either country. The few species of hares found there are small gray creatures. Animals now offered as being from Siberia are pronounced by the government's representative as a strain of Flemish giant rabbits. It should be stated that owing to their great size their skins probably will sell for more than those of other breeds. The skins of common wild rabbits seldom bring over one or two cents each.

VAULTLIKE CAR TO CARRY FUNDS OF PARIS BANKS

Bank messengers and custodians of bank funds in Paris are said to have been robbed so many times in recent months that the bankers have procured a veritable safe on wheels in which to transport large sums of money from place to place. The body of this high-powered automobile resembles a vault. All the sides are inclosed, and even the driver's seat is protected by a low-hanging metal canopy and high sides of metal. With this heavily guarded car properly manned, it is believed that funds can be taken through the thoroughfares in absolute safety.

A Veritable Vault on Wheels Which Paris Bankers have Procured to Insure the Safe Transportation of Their Funds from Place to Place

COMBINATION FENCE, DAM AND GUTTER

An odd type of barrier has been erected at the side of a lemon orchard in southern California, which serves as a fence, a dam, and a culvert. The fruit trees in question are located near an arroyo which occasionally overflows and formerly flooded the orchard and did much damage. To hold back these floods a wall of wood, stucco, and brick was built in place of an ordinary fence.

The heavy posts, which are of brick and set about 12 feet apart, anchor it securely. That the wall might not be

Barrier Erected at the Side of a California Lemon Orchard Which Serves as a Fence and Gutter, and as a Dam That Holds Back Occasional Flood Waters

undermined by water from the road, or arroyo, a cement gutter was laid along its base so as to drain off through a culvert under the highway on which the property abuts.

GLASS GLOBES AS FLOATS FOR FISH NETS

Cod and hake fishermen on the coast of Maine have adopted large hollow glass balls as floats for their ground nets, instead of the usual cork or wood floats, because the glass floats last longer and their sheen attracts the fish. The balls are the size of a large grapefruit, are covered with netting, and attached to the nets by short ropes at intervals of 6 or 8 ft. along the top. The net hangs from them straight down like a wall to the bottom, iron rings about nine inches in diameter serving as sinkers. Glass balls of this kind are cheap and last for many months if made sufficiently thick to withstand the buffeting of the sea and occasional contact with each other.

Cod Nets, Equipped with Hollow Glass-Ball Floats, Drying on Reels on the Beach near Biddeford Pool, Maine: The Rings Seen Are of Iron and Used as Sinkers

LITHOGRAPHIC STONE FROM DOMESTIC QUARRIES

During the past year, for the first time, lithographic stone from American quarries was marketed to a considerable extent. Bavaria has been the chief source of supply hitherto, but war-made conditions are now favorable to domestic quarrying of this peculiar stone, for which lithographers paid in 1916 from 2½ to 27 cents a pound, according to quality. Before the war the Bavarian stone was obtainable at from 5 to 6 cents a pound for 10 by 12-in. slabs of the better grades, and 1½ cents a pound for the poorer grades. About 40,000 lb. of finished stone was sold last year from quarries at Brandenburg, Ky., which contain three distinct beds from which lithographic stone may be obtained after the removal of limestone of other varieties. An effort will be made to market the Kentucky stone after the war, in competition with the Bavarian product.

FRENCH PAPER MONEY LADEN WITH GERMS

A recent test made for the municipal authorities of Rouen, France, showed that the bank notes for the sums of two francs and less, which have been issued during the war by French chambers of commerce, are in a remarkably filthy condition. Notes in circulation but eight or ten days were found to have collected a covering of dirt weighing one-fifth as much as the paper itself. Analysis showed that this greasy coating of filth contained many virulent disease germs.

Beginnings of Reconstruction in France

by Lewis R Freeman

IN the number of visits I have made during the last six months to the western battle front and the regions immediately behind it, no question has been oftener in my mind—save, of course, the constantly obsessing one of how and when the war will end—than that of the way in which the ruined cities and towns and villages are to be rebuilt and rendered fit to receive their former inhabitants. The destruction in the constantly broadening belt over which the 500-mile-long dragon of the battle front has twisted and floundered can be characterized as nothing less than absolute obliteration. Yesterday afternoon—scarcely 16 hours ago—I stood upon the rounded heap of débris which marks the site of the Chateau de ——, in a portion of the Somme sector recently wrested by the French from the Germans, and the colonel who made his home in one of the wine vaults of the historic building had the greatest difficulty in indicating to me, even with the aid of

The First Attempt at Permanent Reconstruction: The American Girl Shown in the View, Miss Daisy Polk, of Group of San Franciscans Who Remember the Experiences of the

his powerful glasses, the exact locations of what had once been three fair-sized villages, the farthest of which was not over 2,000 yards away. Only darker blurs of color upon the shell-pitted desert and the occasional twisted fragment of an iron grill showed where walls and buildings once had stood, and in passing directly through several such one-time villages on the way up to the first-line trenches, all there was to indicate "what once had been" were fragments of metal—usually farming machinery—and bits of masonry.

Besides these villages and towns that have been literally trampled out of existence by the feet of the war dragon, there are those upon which he has only trod in passing or scorched with his breath from afar. These include the places that were evacuated by the Germans after but brief occupation, as well as those which have been, for greater or lesser lengths of time, near enough to the firing line to suffer intermittent bombardment from the guns or air craft of the enemy. Partial only though the destruction is in such places, the aggregate of it is enormous and must form a very considerable portion of the total established by the final reckoning. The cathedral and Hôtel de Ville in Arras, and several of the great buildings of Ypres, are in a far completer state of ruin than the temples at Luxor or Karnak or Baalbec, all of which were subjected to the ravagings of the conquerors of 30 centuries. The mere task of removing the débris of Arras cathedral will be an undertaking apt to give pause to authorities whose hands will be full for many years with more imperatively demanded restoration.

How and when are the war-ruined cities and villages of Europe to be rebuilt? I began asking the question nine months ago, and it is only within the last few weeks that I have been able to get a definite answer, and this only so far as the destruction in northern France is concerned. For the most of this time I was able to follow only the flutterings of straws which served merely to indicate the direction of the rising wind. I read in the London papers, for instance, how a once wealthy merchant of Antwerp, dying a refugee in the south of England, bequeathed all that could ultimately be realized after the war from the sale of his very considerable holdings in various parts of Belgium to a fund to be exclusively used for the rebuilding of the dwelling houses in a certain street in Louvain in which the testator had at one time resided, and which had been completely destroyed when the

San Francisco, is Supervising the Rebuilding of Vitrimont, a Village near Nancy. The Work is Financed by a Great Earthquake and Fire in 1906, and the Period Following

Germans occupied that city. Dutch papers have called attention to the fact that several dozen similar wills have been filed in Holland, many of them after being smuggled through from Belgium, and it is also recorded that a number of wealthy Frenchmen, dying since the outbreak of the war, have left their fortunes to be devoted to reconstruction work in northern France and—provisionally—Alsace-Lorraine.

Later I learned of what were probably the first systematic attempts at actual rebuilding. These were initiated by the English Quakers, who, unwilling to fight on principle, were still anxious to give the most practical aid possible to alleviate the suffering caused by fighting. This, they decided, could not be done more effectively than by endeavoring to render habitable some of the villages in northern France

The Remains of a Village on the Somme: This Is One of the Extreme Instances Mentioned by Mr. Freeman. The Very Bricks and Stones are Pulverized, and It Is Not Probable That Any of the Old Material can be used in Rebuilding

destroyed in the first rush of the Germans, but finally left well to the rear of the established front. As their aim—very sensibly—was to provide shelter as quickly as possible for all those who desired to return to their homes, the work of these kindly and practical people was, and still very largely is, of the most temporary character, in many instances consisting only of waterproof roofs thrown over basements and wine cellars. All of this in time, of course, must give way to permanent reconstruction.

The first—and, so far, practically the only—permanent reconstruction work undertaken in France is that financed and directed by a California society, mostly made up of San Franciscans who learned at first hand what destruction and restoration meant as a sequel to their great earthquake and fire of 1906. The work is under the direction of Miss Daisy Polk of San Francisco, who, with the hearty coöperation of the French authorities, is having rebuilt as fast as funds, material, and labor are available, the dwelling houses in a small village near Nancy. The wishes of the surviving owners of the property are being most carefully consulted in all restoration work attempted, and such buildings as have been completed up to this time follow fairly closely the plan of the originals, and no important departures have been made in either construction methods or in the materials employed. This is, indeed, inevitable under any scheme of comparatively sporadic reconstruction of this character. Modern methods and modern materials can only be adopted when an organized plan of rebuilding is undertaken on a great scale, which cannot possibly be before the end of the war.

So much for the "straws"; now for the rising wind of national effort. From the days of the battle of the Marne, when clear-seeing Frenchmen first began to realize that it was only a matter of time until the enemy would be forced to relinquish all he had taken, France commenced to ponder the rebuilding problem. For considerably over a year, with every ounce of effort mobilized to the task of holding the enemy where he was, it was impossible to do more than ponder and plan; but with the stemming of the initial German onslaughts at Verdun in the early spring of 1916 the time was deemed ripe for taking the first tentative steps in a comprehensive scheme of reconstruction that will eventually restore to those brave and beautiful provinces of northern France everything that the war has cost them, save only the blood of their sons and a number of historic buildings and monuments.

In the same cool, methodical, and painstaking way in which she has paved the way for her victory in war France began paving the way for her victory of peace. The first thing to do—indeed, almost the only thing that can be done until the war is over—was, so far as possible, to take stock of the damage done. A commission for this purpose was formed last spring, its principal objects being designated as follows:

To determine as regards all ruined towns, villages, farms, factories, etc.:

1. The number of houses existing before the war.

2. The number of houses completely or partially destroyed.

3. The destruction to public property, such as mairies (town halls), churches, schools, police stations, museums, monuments, etc., with data as to whether or not reparable.

4. The destruction to factories and other industrial establishments, with data as to the approximate number of persons employed by them.

5. The number of detached farming establishments (bâtiments d'exploitation rurals), wholly or partially destroyed.

The departments in which destruction had taken place were the following: Nord, Pas-de-Calais, Somme, Oise, Seine-et-Marne, Aube, Meuse, Meurthe-et-Moselle, and Vosges. At the very outset it was evident that no statistics could be collected concerning the communes still occupied by the

The Germans Think Some of the Inhabitants of Northern France will Welcome These Cave Shelters after the War. The Germans Build Well and the Underground Houses are Not to be Despised. They are Built into the Hills of Northern France

enemy and those which, though on the French side of the front, were still so exposed to fire that they had been evacuated by the inhabitants and no civil administration was in force in them. The communes still occupied by the Germans (December, 1916) are calculated to number 2,554, out of a total of 36,247 in the whole of France. The greater part of these are in the departments of Nord (545), Aisne (569), and Ardennes (503). The number of communes evacuated by the civil population because of their proximity to the zone of fire is 247, of which 21 are in Pas-de-Calais, 27 in the Somme, 25 in the Aisne, 34 in the Marne, 88 in the Meuse, and 39 in Meurthe-et-Moselle. The number of communes in which destruction had taken place, but which were still in the hands of the French, and in which civil administration had been restored, numbered 753, distributed as follows: Nord, 23; Pas-de-Calais, 71; Somme, 31; Oise, 59; Seine-et-Marne, 35; Aisne, 51; Marne, 258; Aube, 2; Meuse, 59; Meurthe-et-Moselle, 109; and Vosges, 53.

It is evident, therefore, that out of a total of 3,554 French communes more or less completely destroyed, only a little over one-fifth were so situated as to make any estimate of that destruction practicable. It should also be borne in mind that the average of destruction in the 2,554 communes still in German hands is probably much higher than in those in which the civil administration has been restored on the French side of the lines; and again, that the destruction in most of the villages evacuated because of their proximity to the firing line is complete, and that this number is being constantly augmented as the allies, trench by trench, blast the Germans out of their positions and push them backward. All further figures quoted, which I now have permission from the French government to publish for the first time, relate only to the 753 communes in which the civil administration is again in operation. Rough approximations of the destruction in the 2,554 communes still in German hands have been made from information supplied from various sources, but any accurate estimates of such destruction must

await their reoccupation by the French, either by military conquest or following their evacuation by the enemy at the end of the war.

In 299—or about 40 per cent—of the 753 communes under consideration, over half of the buildings have been destroyed, the greater number of these being in the Marne and Meurthe-et-Moselle, in each of which departments there are 87 communes where the destruction is over 50 per cent. In the whole 753 communes the total number of buildings damaged by acts of war is 46,263, of which 16,669 are completely destroyed and 25,594 only partly.

A careful estimate of the value of the property destroyed in the 753 communes under consideration has been prepared, but it is not deemed desirable to publish it at this time. It undoubtedly runs into many hundreds of millions — and possibly thousands of millions—of francs; while for the 2,554 communes still in German hands, and the 247 evacuated by the civil populations because of their proximity to the firing line, the destruction must total anywhere from five to ten times that of those which have been studied.

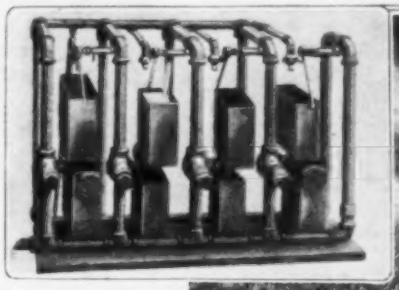
No sooner had the figures compiled regarding the destruction in the region open to observation been digested, than they were submitted to the chamber of deputies, and that body promptly voted in favor of a resolution committing the government in principle to the full indemnification of all losses suffered by its citizens through the invasion of the country by the enemy. This is much the most important step that has so far been taken toward the rebuilding of any of the war-devastated regions of Europe, and constitutes practically an absolute guaranty that this restoration will be carried out not only in the most expeditious but also the most economical way. The term "full indemnification" is, of course, an elastic one, and its exact interpretation has not yet been determined upon. The exact building cost of a house erected from one to five hundred years ago can hardly be determined at this time, nor will it be possible or desirable always to reproduce such a house identically, especially on the score of materials. "Full indemnification" will, therefore, probably be interpreted to mean the cost of reproducing a fairly modern house of approximately the same size and design as the one destroyed. There will, of course, be instances in which an owner may desire to rebuild a larger or a smaller house than the one destroyed, and in the former case this will doubtless be provided for by allowing him to supplement the indemnity from the state from other sources, and, in the latter, by allowing him to make use of the surplus in some other manner. It is certain, however, that an owner will not be permitted merely to bank or invest his indemnity; at least a very considerable part of it will have to be expended in actual reconstruction.

The next great step to be taken in the matter of restoration is that of finance. France, of course, hopes and confidently expects to be able to exact full reparation from Germany for all damage wrought. The payment of such an indemnity, even in the event it shall be exacted, must, at best, be a matter of the somewhat remote future; the need of the money is practically an immediate one. While the actual steps for raising the necessary funds to begin rebuilding have not been taken, the plans are ready. This will be accomplished by the sale of long-time bonds issued by France's leading financial institution, the Crédit Foncier. These bonds will be offered both in allied and neutral countries, and while the most of them will probably be subscribed for in France, it is expected that the demand for them in Great Britain and America will be very heavy.

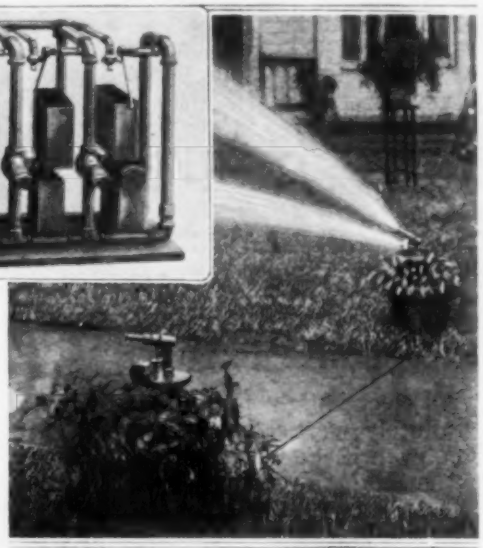
¶ It has been proposed that certain Pacific coast hotels install wireless-telephone apparatus by which guests could communicate with vessels at sea or with other hotels, to make reservations, etc. The manager of an Oakland hotel is taking the initiative in the matter.

AUTOMATIC VALVES GOVERN SET OF LAWN SPRINKLERS

An automatic lawn-sprinkling system has been patented which will spray several parts of a lawn or garden in turn, without supervision, so that, if desired, it can be operated at night—a very favorable time for watering plants or grass. It consists of a set of valves, each of which controls a separate sprinkler. The spraying devices can be distributed over the lawn as desired. Each valve is operated by a pair of buckets attached to its handle, which projects horizontally. They are so positioned that when one is upright the other is upside down. The valve is turned by filling the upright bucket with water until its weight is sufficient to tip it over, spilling its contents on the ground or into a tank, and likewise reversing the position of the two buckets. A half turn of this sort opens the valve, while the next half turn closes it. The buckets are each filled automatically by very small cocks which operate in pairs. One cock fills the bucket whose function is to close a valve, while at the same time the other fills a bucket whose function is to open the next valve of the series. As these buckets tip over, one after another at intervals the sprinklers are supplied with water



Tumbling Water Buckets That Automatically Operate the Valves in Turn

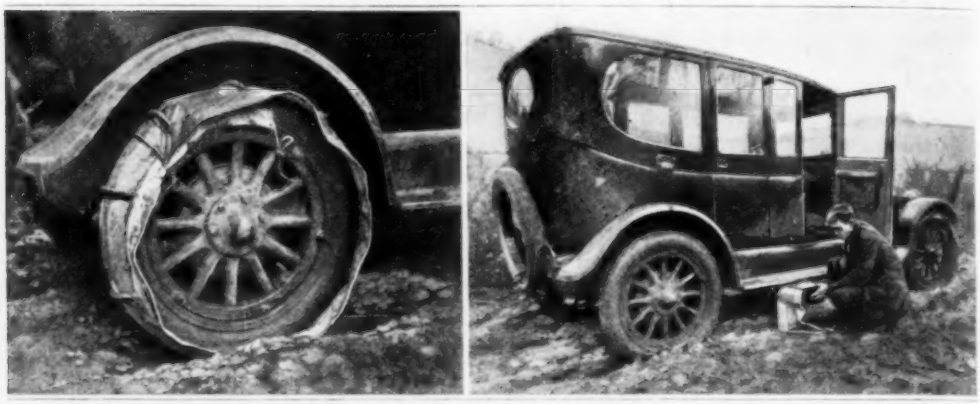


One of Two Automatic Sprinklers at Work: Each is Controlled by a Valve of the Type Shown Above and is Also Provided with Special Apparatus That Causes It to Revolve Slowly, Throwing Water in a Wide Circle

POWERFUL ELECTRIC BRAKE FOR AUTOMOBILES

An interesting safety device for motorists is an electric brake devised by an inventor while seeking a substitute for the air brake in universal use by railroads. It consists of a light but powerful motor which, through suitable gearing, winds on a drum a steel cable attached to the ordinary brake equipment of an automobile, and a controller attached to the steering column, capable of being operated by the driver with one finger. By this simple operation the driver, through the motor, exerts a pull of from 1,000 to 2,500 pounds on the brake rods, and it is claimed that a car moving at 50 miles an hour can be brought to a dead stop within 45 ft. A radical departure with this brake consists in keeping the brake bands and drums oiled.

By Simply Moving His Finger the Driver Operates a Powerful Electric Brake Which Stops a Rapidly Moving Car Quickly without Skidding



Right: Putting the Container, with Partly Unfolded Cloth Tread, in Position, Preparatory to Getting the Car Out of the Mud. Left: The Canvas Tread with Its Rope Grips in Place

SUSPENSION FITTING FOR LIGHT FIXTURES

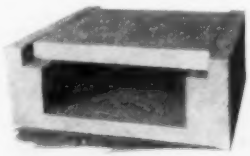
An electric-light fixture can be hung absolutely vertically from an outlet box, even if the latter is set on a slant in the ceiling, by using a special fitting manufactured in Chicago. It consists of a cast-iron covering that can be screwed over any standard 4-in. outlet case and is provided with a ball-and-socket joint, to the lower end of which the stem of the light fixture is attached. This joint allows a chandelier to swing in any direction, through an angle of 25°, but will not permit twisting. In concrete buildings, for example, where the outlet boxes are often set imperfectly, this fixture is of special service.

CANVAS TREADS PREVENT TIRES SLIPPING IN MUD

Canvas treads have been patented recently which enable one to get a car out of the mud or mire with a minimum of inconvenience. Each of these coverings consists of a long strip of strong canvas, provided with numerous grips in the shape of short pieces of rope attached to it transversely. When a car is mired the driver inserts a box, containing a tread, into a holder attached to the under side of the running board and, partly withdrawing the canvas, ties one end of it to a spoke of the hind wheel. The other rear wheel can be similarly provided for, if desired. Then, by attempting to "spin" the wheels in the mud, the canvas will be wrapped about them without further trouble, and, because of the grips, they will suddenly acquire a traction that even chains do not give. The canvas also prevents the tires from being overheated by slipping.

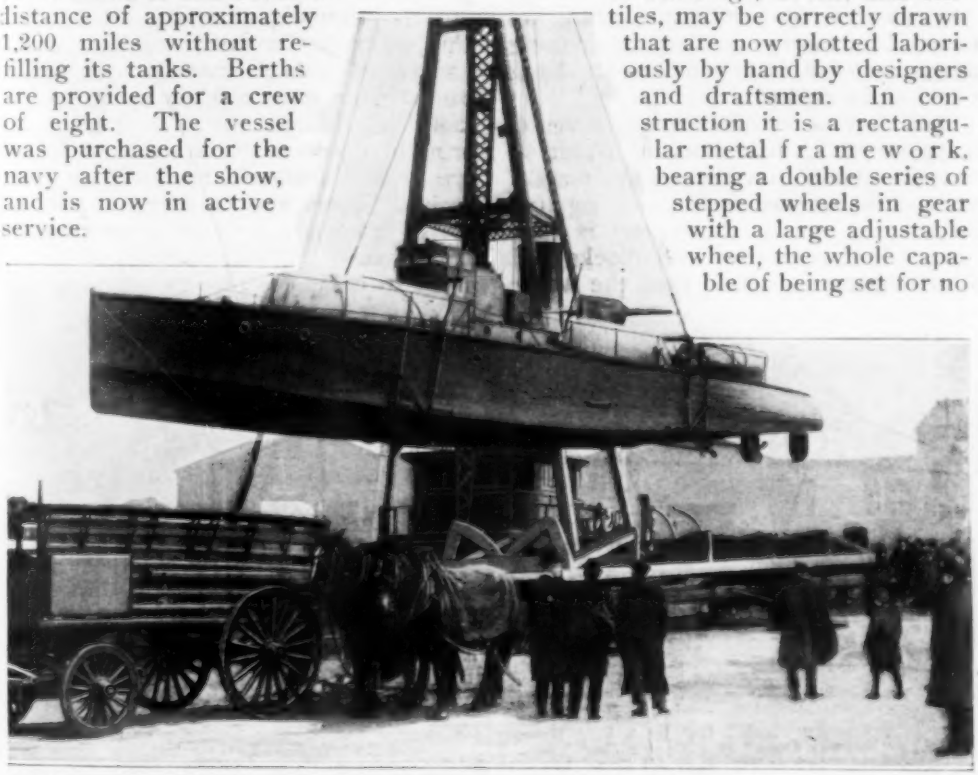
CHEAP CONCRETE CULVERT IS REMOVABLE

A removable concrete culvert, or crosswalk, for street intersections, has been invented by Denver's street commissioner, the cost of which is said to be only a trifle more than first-class wooden culverts. The units are made indoors and are 3 ft. 10 in. wide and 17 in. high. The covers, which are reinforced and measure 3 ft. in length, will sustain a weight of from 15 to 20 tons. In case the passageway beneath is clogged, the covers can be lifted to remove the obstruction. Should storm sewers be installed in the streets where these culverts are located, the latter can be taken up and used elsewhere.



PATROL BOAT OF NEW TYPE ADDED TO THE NAVY

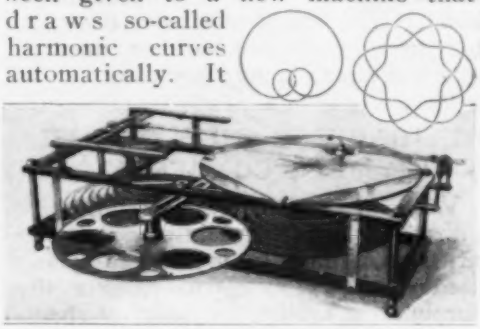
Among recent additions to the navy is the 60-ft. patrol boat "Chingachgook," officially known as "No. 10," which was exhibited at the last annual motorboat show in New York, as a sample of the type approved by the Navy Department for coast defense. It was hoisted from the water by a floating derrick and transported on a special truck to the show. Its beam is 10 ft., draft 3 ft., and steel bulkheads divide the hull into six compartments. Its armament consists of a three-pounder rapid-fire gun aft, and a .30-caliber Colt automatic forward. The gasoline tanks have a capacity of 810 gal. and two 8-cyl. motors give it a maximum speed of about 26 miles an hour. At that speed its radius of action is 600 miles, but at a cruising speed of 12 miles it can cover a distance of approximately 1,200 miles without refilling its tanks. Berths are provided for a crew of eight. The vessel was purchased for the navy after the show, and is now in active service.



Hoisting a New-Type Patrol Boat from the Water to a Waiting Truck for Exhibition at the New York Motorboat Show: Many Private Owners are Building Boats of This and a Smaller Size, Approved by the Navy for Coast Defense

NEW DRAFTING DEVICE DRAWS MANY CURVES

The name cyclo-harmonograph has been given to a new machine that draws so-called harmonic curves automatically. It



By Setting This Machine Properly 252 Distinct Types of Curves may be Drawn Automatically

is the invention of a professor of mathematics at the University of Washington. By its aid many kinds of curves, among them many used in decorations of buildings, books, and textiles, may be correctly drawn that are now plotted laboriously by hand by designers and draftsmen. In construction it is a rectangular metal framework, bearing a double series of stepped wheels in gear with a large adjustable wheel, the whole capable of being set for no

less than 252 distinct types of curves. The surface to be drawn upon is carried on a circular revolving table, over which the pencil is held by a mechanical arm. The machine is operated by hand. Though it was not designed for commercial use, it has aroused much interest among architects.

DRY-DOCKING SHIPS ON RAILS TO MEET CONGESTION

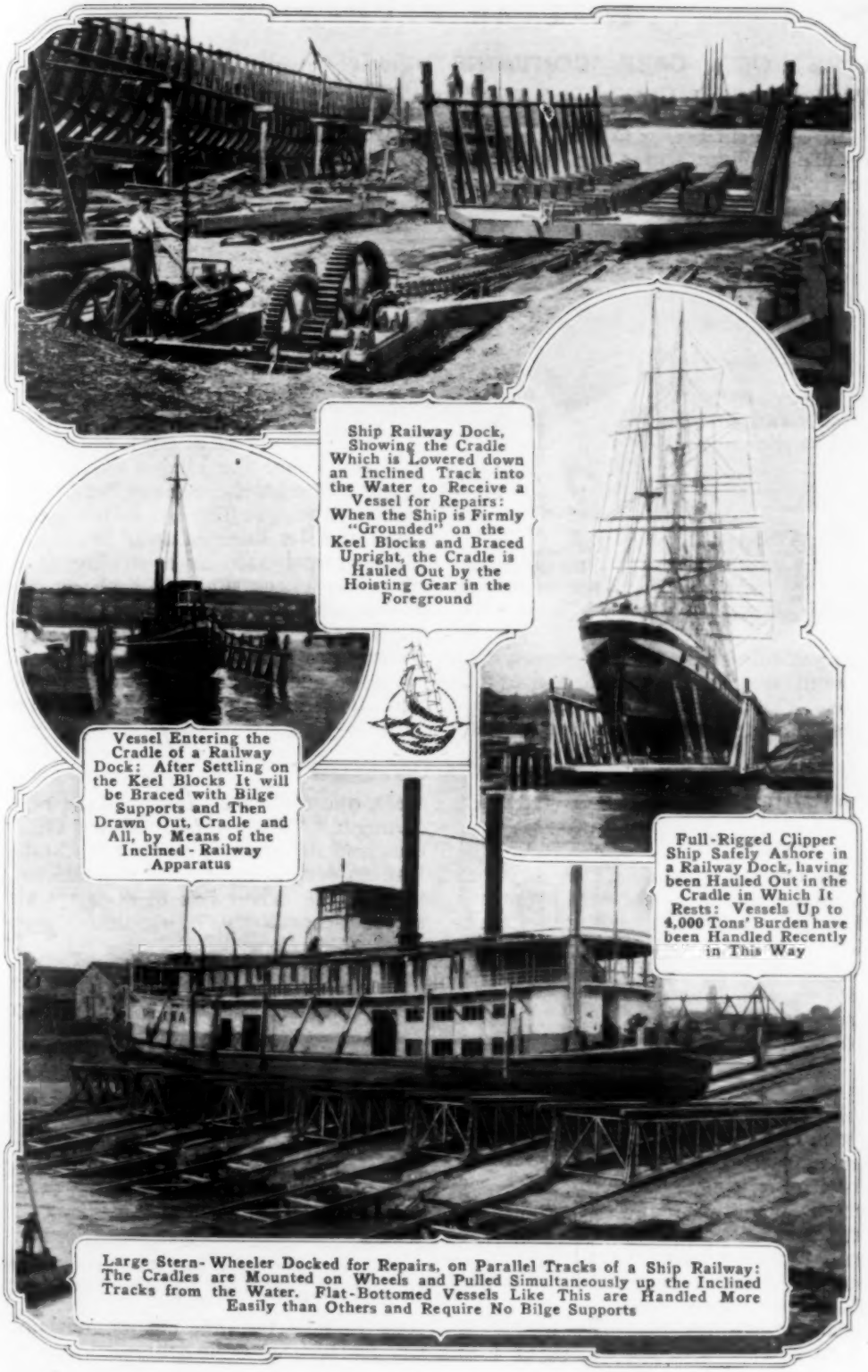
With the increasing demand for ships, due to the present-day shipping situation, American vessels are being used to their full capacity. For the purposes of safety, frequent overhauling becomes necessary, which because of the crowded condition of American shipyards, requires dry-docking. Limited facilities for this purpose have led American shipowners to put into use what is known as a "railway dry dock" more extensively than heretofore. Economy of time and expenditure are controlling factors in this dry-docking system, which is capable of handling even the largest of ships.

The purpose of dry-docking a vessel is to give it a berth out of water so that all parts of its bottom are readily accessible for the making of repairs. In all dry docks, the vessel is first "grounded" firmly on keel blocks and bilge supports applied; then the water is removed. In the basin and floating docks, this is done by pumping machinery; in hydraulic docks it is done by lifts, taking the weight of both vessel and dock.

The "railway dock," on the other hand, is built on a track, resting on firm foundations and constructed on an incline. When the vessel has been placed in position, being held by keel blocks and bilge supports, the operation of dry-docking it is accomplished by powerful hoists, which haul the dock up the inclined track. The largest of the railway docks can accommodate a ship of 4,000 tons, and docking a vessel is a matter of not more than an hour, while it sometimes takes five hours in the ordinary basin dock to lift a ship out of water.

On the smaller docks of this type, the operation may take not more than from one to two minutes after the grounding of the vessel. The best record was established when a 1,600-ton ship was taken out of water by a dock and returned in 25 minutes. In some cases, from ordinary appearances, it looks as though the ship had been brought up on dry land. These docks are being resorted to both in the United States and in Europe, particularly in ports where the congestion is the greatest and every effort is being made to complete repairs quickly.

Schooners Hauled Out by a Ship Railway for Repairs and Resting Securely on a "Railway Dock" at a Shipbuilding Yard: This Form of Dock is Now Largely Used to Aecommodate Vessels of All Sizes, Owing to the Unprecedented Demand for New Ships and the Crowded Condition of All American Dry Docks



Ship Railway Dock, Showing the Cradle Which is Lowered down an Inclined Track into the Water to Receive a Vessel for Repairs: When the Ship is Firmly "Grounded" on the Keel Blocks and Braced Upright, the Cradle is Hauled Out by the Hoisting Gear in the Foreground

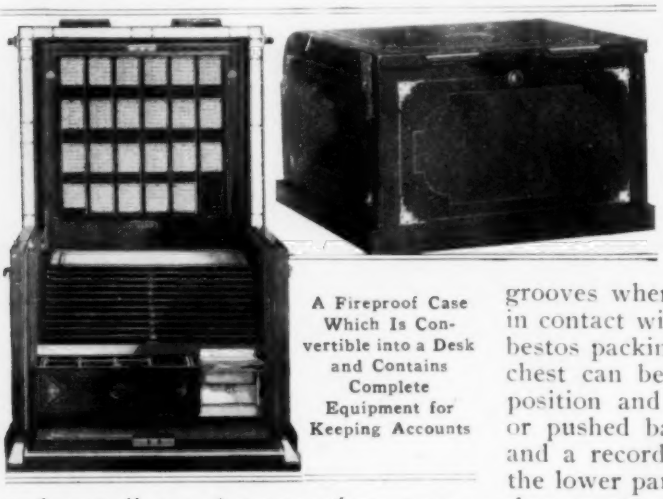
Vessel Entering the Cradle of a Railway Dock: After Settling on the Keel Blocks It will be Braced with Bilge Supports and Then Drawn Out, Cradle and All, by Means of the Inclined-Railway Apparatus

Full-Rigged Clipper Ship Safely Ashore in a Railway Dock, having been Hauled Out in the Cradle in Which It Rests: Vessels Up to 4,000 Tons' Burden have been Handled Recently in This Way

Large Stern-Wheeler Docked for Repairs, on Parallel Tracks of a Ship Railway: The Cradles are Mounted on Wheels and Pulled Simultaneously up the Inclined Tracks from the Water. Flat-Bottomed Vessels Like This are Handled More Easily than Others and Require No Bilge Supports

FIREPROOF CASE CONTAINS WHOLE ACCOUNTING OUTFIT

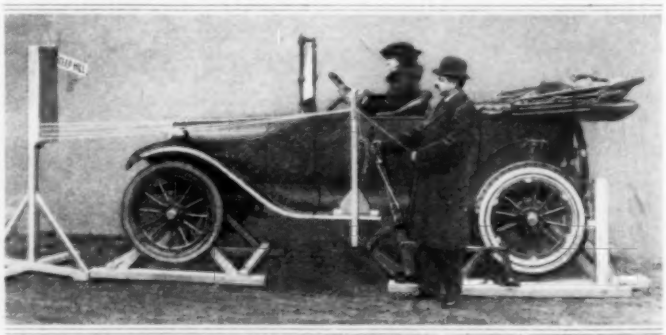
In one serviceable article, designed for use in offices, stores, etc., have been combined means for keeping accounts and recording cash transactions, a convenient writing desk, and a fireproof safe. The case in which this equipment is incorporated is made with three-ply walls of cold-rolled steel. Between the outer and the central ply of these walls is an inch of corrugated air-cell asbestos. Inside the central ply is a ¾-in. dead-air space, while against the inner ply is a thickness of solid asbestos. The top is hinged to the back in such a manner that on raising it, the rear drops down a few inches, permitting the cover to stand vertically and hold in full view the index which attaches to the under side of the top. In the grooves where the hinged parts come in contact with the sides is flexible asbestos packing. The front side of the chest can be lowered to a horizontal position and used as a writing desk, or pushed back under a cash drawer and a recording device which occupy the lower part of the case. Above the drawer are numbered racks, so placed as to be accessible at all times, which are used in keeping individual accounts.



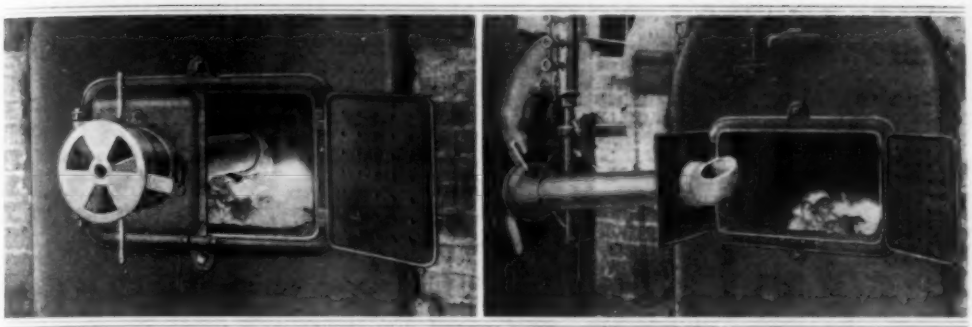
A Fireproof Case Which Is Convertible into a Desk and Contains Complete Equipment for Keeping Accounts

NOVICES LEARN TO DRIVE AUTO IN STATIONARY CAR

An eastern automobile agency has devised a mounting for cars by means of which a novice at driving can experience most of the sensations of running his auto up and down hill, over muddy roads, etc.,—all while sitting in a motionless machine. This framework holds the wheels off the ground. In place of the rear tires are hollow iron castings about which powerful band brakes are fitted. They are controlled by a lever placed within reach of the instructor who stands beside the car. By means of cords he throws various signs into view, one after the other. These read "Danger," "Steep Hill," "Down Hill," etc., and the teacher adjusts the brake load to correspond to the sign shown, so that the driver has to regulate his motor accordingly. Beginners learn very rapidly by this means, without risk to themselves or others.



Mounting for an Automobile with Brakes about Back Wheel and Signals in Front: With This Equipment the Pupil Learns to Operate the Car without Endangering Himself or Others



Left: In This Position the Pipe Forces Preheated Air Down into the Fuel, Greatly Increasing Combustion. Right: The Attachment Withdrawn, Showing the Simplicity of Its Construction

DRAFT ATTACHMENT FOR FURNACE SAVES FUEL

More perfect combustion and a large saving in fuel, it is claimed, result from the use of a patent draft for furnaces, boilers, and stoves, which is made in Gary, Ind. The attachment is inserted through an opening in the furnace door and consists of a large pipe terminating at the inner end in a right-angle curve, while at the outer end is a shutter. The tube can be introduced any desired distance into the fire pot and can be set with the curved end pointing up or down. When in the latter position and when the shutter is open, hot air is forced down into the burning fuel. The preheated oxygen supplied in this way tends to increase combustion and force the heat toward the sides of the furnace. By pointing the tube upward the draft through the fuel is lessened, making it possible to bank the fire very effectively.

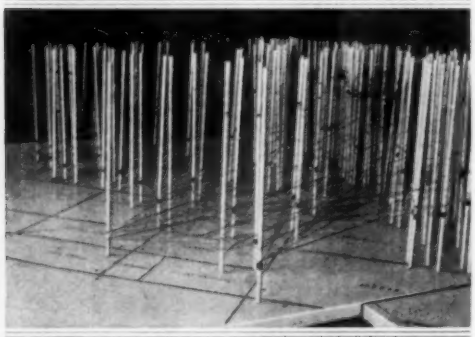
HAND SPRINKLER OPERATES BY COMPRESSED AIR

A new type of pressure sprinkler recently placed on the market is wheeled about by hand. It is designed to lay the dust on street pavements and to prevent the usual dust nuisance associated with hand-broom sweeping. It includes a 45-gal. water tank mounted between two large wheels, with a small horizontal compressed-air tank which furnishes sufficient pressure to throw the water 35 ft. laterally from a needle-shower device in front of the apparatus, about eight inches above the ground. The needle shower is controlled by a lever within reach of the operator as he trundles the sprinkler along. It is claimed that there is no waste and no splash with this sprinkler, and that it is adapted for sprinkling tennis courts, lawns, public halls, and train sheds as well as pavements. A pressure gauge is mounted on the tank, and also a valve for use with the refilling hose.

This Hand Sprinkler Carries a Small Tank of Compressed Air behind the Water Tank and Throws a Spray Clear across a Wide Pavement

DATA ABOUT OIL WELLS SHOWN IN "PEG MODEL"

Data regarding 650 oil wells on the Pacific coast, in a region covering sev-



Map of Oil Fields with the Location of Each Well Indicated by a Tall Peg Marked with Colored Rings to Show the Depth of Various Strata. The Strings Show the Slope of the Strata

eral square miles, are made instantly available by means of a "peg model" of the oil fields, which measures 6 ft. 5 in. by 20½ ft. Various property divisions are marked on the maplike representation, and the location of wells is indicated by holes in which tall wooden pegs are inserted. The pegs are painted with rings of red, green, and black, and represent the different strata of sand, water, oil, etc., encountered in boring, and enable one to ascertain at a glance various facts about the wells. Black rings show the sea level. Connected with the pegs are numerous strings indicating the position and slope of different strata. For example, at the west side, oil sand was found at a depth of about 250 feet, while three and a half miles to the east it was encountered at a depth of 3,250 feet.

SUNKEN DREDGER FLOATED BY SIMILAR CRAFT

The upper waters of Oakland Harbor, Calif., were the scene of a peculiar wreck and rescue recently, when a large dredger of the clamshell type sank by the bow at its pier and was raised by means of another dredging vessel. The latter was a steam schooner which did notable work in preparing the San Francisco fair grounds, having been refitted with rotary pumps and suction apparatus. The big clamshell dredger was caught by the falling tide on three forgotten piles, which held up the starboard side of its stern while the bow sank in 20 or 30 ft. of water. Divers with difficulty sawed off the three piles under water, boarded over the holes made in the sunken hull, and covered up all other vents, ports, and hatchways; after which the refitted steam dredge was moored alongside the wreck and with a 12-in. suction pipe pumped out the submerged hold. This being done at low tide, the rising water then floated the great hull, and it was towed to a marine railway for repairs.

Left: View of Sunken Dredge, Which was Pumped Out by Another Dredging Craft, Showing the Elevated Stern under Which Divers Sawed Off Piling. Right: This Shows the Rescuing Vessel at the Scene; Also the Large Suction Pipe Running to the Wreck, and Diving Operations at the Stern

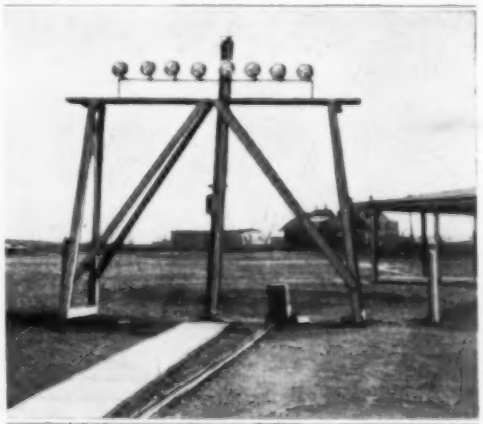
Ice-Festooned Scene in Detroit Automobile Factory After the Firemen had Extinguished the Blaze That Partly Destroyed the Plant

CARS PRESENT FANTASTIC APPEARANCE AFTER FIRE

One of the most fantastic-appearing collections of automobiles ever assembled was to be found not long ago in a Detroit factory, after the firemen had extinguished the flames that partly destroyed the building. Many cars were burned in this conflagration, but others, in various stages of completion, were thickly crusted over with the ice which formed because of the intensely cold weather. From the frames and wheels hung glistening rows of icicles that anchored the machines to the floor, while all about them hung huge festoons of ice, formed by the freezing of tons of water that flowed down from the floors above.

TRAPSHOOTING GROUNDS ELECTRICALLY LIGHTED

Trapshooting at night as well as by day is enjoyed by members of a gun club in a Boston suburb which has installed a special lighting system that brilliantly illuminates the club grounds. About 75 feet back of the traps, a narrow platform, 15 ft. high, has been erected on which are mounted eight 250-watt stereopticon lamps with powerful reflectors. The shooters find that in some instances the targets can be seen more quickly under these bright lights than in the daytime, when there are more visible objects to distract the attention.



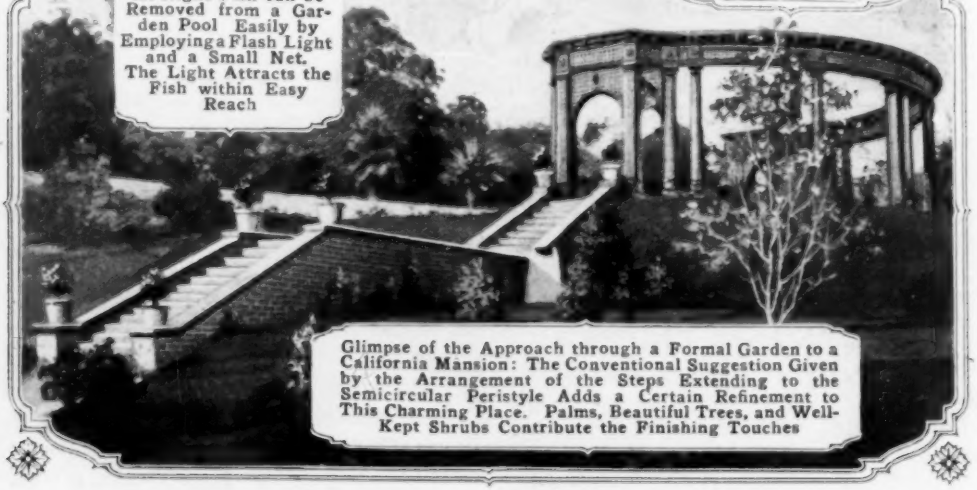
Battery of Eight Powerful Electric Lights on Grounds of a Trapshooting Club near Boston, Which Permits the Members to Enjoy Clay-Pigeon Shooting at Night as Well as in the Daytime

ARTISTIC POOLS AND VISTAS IN GROUNDS

Six Short Flights of Steps Separated by Pergola-Covered Landings Lead up the Terraces and Reach the Pasadena Mansion Pictured at the Left. Near the Bottom Is a Large Platform, and beneath the Rose-Entwined Crossbeams Are Semicircular Benches Where One may Rest

Goldfish Lend a Brilliant Note to This Small Pool in Its Tropical Setting. At Night Fish can be Removed from a Garden Pool Easily by Employing a Flash Light and a Small Net. The Light Attracts the Fish within Easy Reach

A Most Unusual and Effective Vista: Narrow, Sunken Pools Divide the Stepped Walk That Passes through an Avenue of Cedars to the Walled Flight of Stairs Mounting the Elevation Ahead. At the Top Is an Imposing Pergola and Beyond, the Mansion

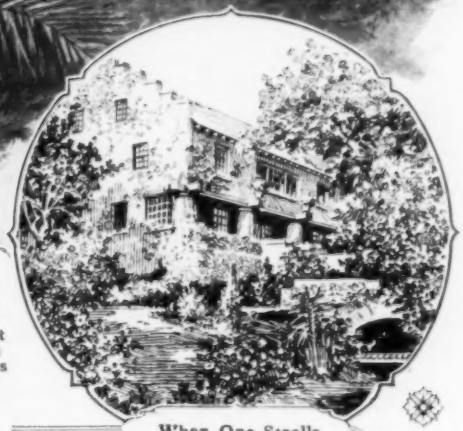


Glimpse of the Approach through a Formal Garden to a California Mansion: The Conventional Suggestion Given by the Arrangement of the Steps Extending to the Semicircular Peristyle Adds a Certain Refinement to This Charming Place. Palms, Beautiful Trees, and Well-Kept Shrubs Contribute the Finishing Touches

SURROUNDING BEAUTIFUL WESTERN HOMES

Through Heavy Gates at the Bottom of the Terrace, Broad Steps Lead to the Entrance of This Picturesque Japanese Home Set in a Sunny Spot amid Palms and Shrubbery. It is Situated in California and Never Fails to Draw Forth Pleased Expressions of Surprise from Those Who Happen upon It for the First Time

When Interest is Taken, Back Yards Become as Delightful and Inviting as Front Ones. This Shows an Illuminated Fountain at the Rear of a Western Residence, Where It Is Visible Day and Night to Motorists Passing along a Near-By Highway



When One Strolls along a Path That Winds beneath Spreading Oaks and Crosses a Picturesque Bridge Arching a Babbling Brook, He is Refreshed. Visitors are Repaid in This Way for Their Walk to the Hospitable Doors of the Home Above

In a Magnificent Garden at Beverly Hills, California, One may Find This Poetic Spot. The Pool, Which Is Nearly 200 Feet in Length, is Beautified with Lilies. A Concrete Wall, Two Feet High, Confines the Water, the Surface of Which Is About a Foot and a Half above the Surrounding Lawn

CHECKERED DANGER SIGNS IN COLUMBUS STREETS

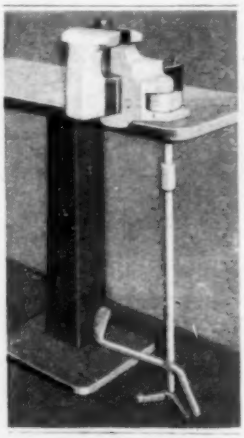
Checkerboard signs are being erected in Columbus, Ohio, as danger signals. Certain street intersections and the narrow parkways in the center of wide thoroughfares have been the scenes of numerous motor accidents, and these boards, composed of black and white squares arranged alternately, have been set up as warnings at these places. They bear no inscription except a statement that they were installed by the Columbus Automobile Club. It is believed that the checkered pattern will attract the eye readily and soon will come to be recognized by all as an emblem of danger. The city has promised to equip them with red lights. The signs measure three by six feet.

NATIONAL FOREST SURVEY MADE WITH A CAMERA

Unusual methods were adopted in making a survey recently of the Columbia National Forest in the state of Washington, which comprises an area of over 1,000 square miles, mostly rough, hilly, and heavily timbered land, difficult and expensive to survey in the ordinary manner. With the aid of a photographic outfit, however, a satisfactory survey was made by one member of the Forest Service, who covered 93 square miles a month on an average during the progress of the field work. This has occupied several open seasons, the winters being spent in working up the field notes into accurate maps showing the contours and all streams in the forest. The surveyor was accompanied by one assistant and packer, and traveled on horseback, with two pack animals. Observations and photographs were made from definite "stations" when the weather permitted, about 15 such stations being occupied each month. Four exposures were usually made with the camera at each station, each plate developed taking in the view within an angle of 65°. Each photograph was marked on its margin with a horizon line by which elevations and depressions were subsequently measured for map making, and it was found that the contours drawn by this method were surprisingly correct, usually coming within 50 feet or so of actual elevations. About 50 square miles were mapped each month when field work was impossible, the scale used being 1 in. to the mile. The total cost for field and office work was approximately $4.60 a square mile, which is regarded as low, compared with the cost of ordinary surveys.

FOOT LEVER OPERATES MACHINIST'S VISE

A new type of vise, which is operated entirely with foot power, can be employed to advantage in machine shops, and elsewhere, because it allows the mechanic the free use of both hands, and can be locked or unlocked quickly. Extending downward to the floor from the bench to which the vise is attached is a shaft, from near the lower end of which project two pedals, one to the right and the other to the left. The upper end of the shaft terminates in a cam. When the left pedal is pressed with the left foot this cam revolves and causes the movable jaw of the vise to be drawn up tightly and locked. Pressure with the right foot on the right pedal instantly releases the jaw.



CLAY FIGURES USED FOR MOVING PICTURES

Motion Photographs of Sculptress Modeling Her "Clayfolk"

In a new style of moving pictures little clay models of human figures are used to represent the actors. The result, when seen on the screen, is both startling and amusing, the tiny clay figures seeming to walk, jump, and go through all the motions of talking and singing as if actually alive. Such pictures are called animated sculpture. They owe their origin to a woman sculptor of New York, whose clayfolk, as she calls them, are photographed in a succession of slightly different poses, each specially modeled to carry out the action of a regular scenario or film story. The process of molding the figures is slow and laborious, as 16 different poses are required to make a foot of film. Thus if the action of the story calls for four actors in the picture, a film of ordinary length, say 200 ft., requires the careful molding by the sculptor's hands of at least 12,800 different poses for the clay figures. In some scenes, however, only slight changes are needed to give the necessary animation, these being quickly made by the deft touch of the sculptor while the camera man waits to photograph them.

Strip of Film Showing Clay Figures Acting for the Movies

ALL GARAGES FACE ON ONE ARTISTIC DRIVEWAY

For the purpose of selling quickly property in a certain block in a new subdivision near Portland, Ore., a real-estate agency offered to give a low-priced automobile to each purchaser of one of these homes. For this reason every house is provided with a garage, and in planning approaches to these outbuildings special care was taken

All Houses in This Block Have Garages Facing on a Common Artistic Driveway, Thus Avoiding the Necessity of Private Entrances. Right: Paved Driveway on Which All Garages in the Block Face

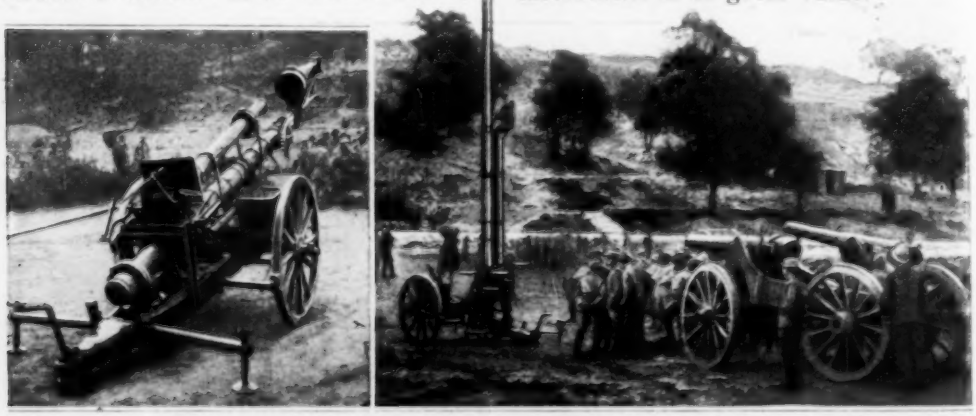
to have no driveways passing through the front yards. The houses are arranged in two rows, standing back to back, with the garages abutting on a common paved thoroughfare that runs down through the center of the block. Each of the structures is designed along individual and artistic lines, and about midway between the ends of the square is an oval flower bed. By these means the real-estate firm succeeded unusually well in avoiding all suggestion of an ordinary alley. The plans also include formal gardens facing on the drive.

CONDUCT LANGUAGE CLASSES IN DEPARTMENT STORE

Courses of instruction in several foreign languages are being given in one of Chicago's large department stores. No tuition is charged, the classes are conducted by experienced instructors, and some 400 pupils are enrolled. The undertaking, an ingenious, unusual sales scheme, is being tried out for the first time. It is promoted by an eastern concern that exploits a phonograph system of language study. Instruction in French, German, Spanish, or Italian is offered to any person who is sufficiently interested to matriculate and attend the classes, each of which is limited to 30 members and meets once a week in a lecture room provided in the department store. A course of instruction consists of 20 lessons and is carried out by the conversational method. By attending the classes a pupil does not obligate himself to purchase the phonograph records, but obviously the purpose of the plan is to interest him so thoroughly that he will want to acquire them for further home study.

FRENCH CAPTURE GERMANS' GIANT PERISCOPE

One of the most interesting of the devices which have been produced during the war to amplify the range of human vision, is the giant periscope shown here, which the French captured from the Germans. With this equipment an observer need not seek out some tall tree or high tower from which to spy on the enemy, for this collapsible steel mast can be reared at any desired point in a very few minutes. At its upper end are a conical tube and lenses by which horizontal light rays are deflected downward to the observer stationed below. The apparatus is strongly built and the carriage is so made as to form a wide-spreading base. Supported by the carriage alone the mast can be raised to a height of 50 ft. When it is extended to its full length, which is 80 ft., guy ropes are required to steady it. For detailed observation of distant points, particularly in a rolling or mountainous region, such an instrument is of great value.



A Powerful Land Periscope, Captured by the French from the Germans, Which can be Reared to a Height of 80 Feet. It is Shown Extended at the Right, and at the Left Collapsed, in Which Position It Closely Resembles an Ordinary Field Gun

LOST BY MAP AND COMPASS

THE following article, written by a man actively engaged in aviation, casts an interesting sidelight on the perils of the airman's calling. It will be recalled that the two men referred to in the introduction are Lieut. Col. Harry G. Bishop and Lieut. W. A. Robertson, U. S. A. These airmen made a flight from San Diego on January 10th, broke a propeller, and alighted to find themselves lost in Mexico. Robertson was discovered by a civilian searching party on January 18th and directed the rescuers to Bishop, who, unable to travel, was 30 miles farther inland. Both men suffered from lack of food and from exposure. Two oranges and two sandwiches each, and water from the radiator of the machine, had been all the food and drink they had had since the date of their flight.—Editor.

A SHORT time ago two army airmen left the aviation school at San Diego to make a cross-country flight into the Imperial Valley. An automobile map of the country was the best that could be obtained. The aeroplane was equipped with a compass which later proved to be faulty. They lost their bearings and finally landed on the east shore of the Gulf of California, which they had mistaken for the Salton Sea. The machine was damaged in landing and the airmen undertook to walk to a town near the Mexican border which they thought to be about 25 miles distant. They walked for more than a week, and were exhausted from lack of food and water when they were at last rescued.

No doubt a great many people are wondering how it is possible to become lost so easily in an aeroplane equipped with map and compass. A statement of some of the difficulties encountered in flying cross country, especially over mountainous and desert country, will, perhaps, clear up the matter a bit.

First to be considered in flying over strange country is the accuracy of the map. The maps of the mountainous and desert regions of southwestern United States and northern Mexico are sadly inaccurate. The landmarks are not at all shown in their true relations to each other, a lake is not mapped in its true shape, cañons and rivers are not shown taking their true directions. Any one of these discrepancies is suffi-

"The landmarks are not at all shown in their true relations to each other, a lake is not mapped in its true shape, cañons and rivers are not shown taking their true directions. Any one of these discrepancies is sufficient to lead the pilot astray."

cient to lead the pilot astray. Now, in addition to an inaccurate map, suppose the weather is cloudy, and the flier catches only glimpses of the landscape; it is then practically impossible for the pilot to find his way over strange country. Not enough of the earth can be seen to enable him to use his map intelligently, even though it should be an accurate one. It is under this condition that the pilot has to rely on his compass.

The compass in an aeroplane is very often a treacherous instrument and not to be trusted too far. In mounting a compass in an aeroplane a great many conditions are met with which are not found on board a ship, and it is next to impossible to mount a compass in an aeroplane so that it will give the true directions. Many corrections have to be applied. The close proximity of the motor has to be considered, for the various directions in which the machine may be pointed each has a correction, and a variance of from 30 to 40° may be noted when the motor is running and when it is not. After a compass is once installed in a machine any small change in the metal parts of it will affect the reading of the compass, and scarcely a day passes but there is some such change being made. And again any magnetic substance that the pilot may carry in his pocket will cause the needle to deviate. In short, the reading of a compass mounted in an aeroplane is never accurate, and to what extent it is inaccurate is unknown to the pilot. However, the compass will give a general direction and serves as a check on the map. To follow the compass blindly is a hazardous undertaking, for it may be several degrees off and there is no knowing how fast a cross wind may be drifting the machine. The airman can tell in a general way the direction in which he is being carried by a cross wind, but he has no way of knowing how fast. A 30-mile cross wind—moderate for the upper atmosphere—will carry the machine many miles off the course in a short time. As an example, an army aviator, flying from Los Angeles to San Diego over the clouds, had to fly by compass, and, consulting his map, laid a proper course and followed it by compass. A strong cross wind blew him off his course and many miles out to sea. A rift in the clouds disclosed to him his plight, and what he had taken for mountain tops was, in reality, the Santa Barbara Islands. He reached the mainland only a few minutes before his supply of gasoline was exhausted.

The two airmen who were lost in Mexico are both experts in the use of maps—it is a part of their profession—the pilot is an experienced flier, but an inaccurate map, a faulty compass, clouds, and a strong wind, each was a sufficient reason for causing them to lose their way.

Thus it is seen that a cross-country flight over strange and inaccurately mapped country is a hazardous undertaking, fraught with many dangers, and comparable with putting to sea without charts or compass.

MANY SPECIAL USES FOR SPONGE RUBBER

A product which is now attracting the attention of many manufacturers, because of the special uses to which it can be put, is sponge rubber. On account of its cellular structure it is very light and at the same time is water-tight and nearly gas-tight. These properties tend to make it an ideal substance for life preservers, for it will not waterlog and it can easily be made to conform to any shape. Of course punctures do not affect it, and for this reason it has been seriously proposed as a filler for automobile tires. Almost endless experimenting has shown that, after all, air serves as the best cushion for tires. Sponge rubber supplies the air cushion, and at the same time is said to "stand up" under long usage. Having great insulating properties it can be used also in soundproofing, in clothing for airmen, and so on.

CART FOR CORNSTALKS CAN LOAD ITSELF

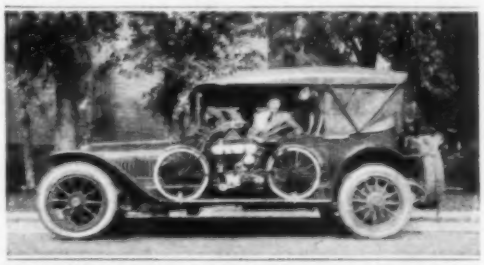
By the invention of a New Jersey farmer the problem of removing bunches of cornstalks from the field to the barn has been made comparatively easy. A new two-wheeled cart with special mechanical features does the trick, so that one man with a team can cart in an average field of fodder in one day. The cart consists of a low frame with a small winch attached to its under side. It works by backing the team up to a bunch of stalks, where the frame is tilted back against the bunch by means of the tongue, which is hinged; then wrapping a rope, or small chain, around the stalks, and tightening it with the winch. The team is then started and the frame with the bunch of stalks falls forward into the normal position of a cart for the trip to the barn, locking automatically when horizontal. In unloading, the stalks are placed upright, as in the field, by unlocking the frame and backing the team as before, after which the rope is removed and the cart returns for another bunch.

New Cart That Loads Itself with Cornstalks in the Field, as Shown Here, and Unloads Them Upright in the Barn

Removing a Big Bunch of Stalks from the Field by Means of the Self-Loading Cart

AGENT FOR MOTORCYCLES CARRIES SAMPLE IN CAR

It seems a little strange to find a sales manager for a motorcycle concern visiting his agencies in a big touring car and carrying one of the machines that he sells on the running board, but a certain Pacific coast sales manager has learned that this is by far the most satisfactory arrangement. For long journeys motoring is more comfortable than motorcycling and permits one to carry more luggage, and a companion if desired. The manager finds that he becomes less travel-stained and so is ready to talk business on short notice. His motorcycle can be detached from the running board in an instant when he wants to make a demonstration. The arrangement also enables him to keep his sample machine looking as good as new.



A Sales Manager for a Motorcycle Concern and the Touring Car Which He Uses to Carry His Sample Machine from Place to Place

MACHINE TAKES DICTATION FOR CUTTING MOVIE FILMS

A visitor to the studio of a well-known motion-picture concern, if he

Motion-Picture Director Viewing a New Film and Dictating into a Dictaphone Instructions as to How It should be Cut or Altered

calls at the proper time, will find the director talking into a dictaphone while he critically views new pictures that are being projected on the screen for the first time. This innovation has been introduced to save time and avoid errors in cutting films. As is well known, after a picture has been taken it is often necessary to cut out certain parts of the film. Proper captions must be inserted also. In the studio in question, instructions relating to these matters formerly were given to a "cutter" who sat beside the director and wrote them down while the film was being shown. This arrangement often resulted in error and in a waste of the cutter's time. Now the phonographic record, bearing full instructions, is sent to the cutting and assembling room with the film. With the dictaphone receivers to his ears the cutter is able to spend practically all his time following instructions and wastes none taking dictation.

Cutting and Assembling Room, Showing the Film Cutter Following the Director's Orders, Which are being Reproduced from a Dictaphone Record

TIE WIRES INJURE EFFECT OF WALL INSULATION

While attempting to insulate thoroughly the concrete walls of a cold-storage warehouse that was being erected in a western city, the high conductivity of steel was lost sight of, to the subsequent detriment of the building. A thickness of cork was inserted in the walls, but unfortunately short lengths of steel wire were passed through it and imbedded in the concrete on either side. This mistake in a certain degree defeated the purpose of the insulation, for the innocent-looking tying wires now serve most excellently to conduct heat and cold through the barrier of cork. As a result moisture spots the inner surface of the walls around the scores of places where the wires are anchored.

HANDSOME FISH HATCHERY HIGH IN WESTERN RANGE

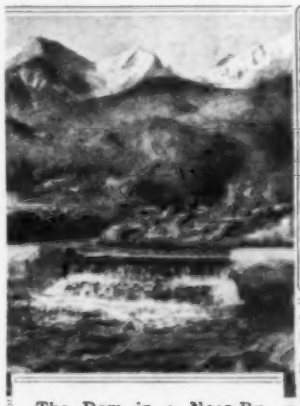
High up on the eastern slope of the Sierra Nevada Mountains, near Independence, Calif., and the home of the golden trout, the State of California has erected the first unit of what will be one of the largest fish hatcheries in the world. It stands at an elevation of 4,300 ft. in the shadow of peaks two and one-half miles high. The structure

cost $75,000, and is of special interest because of the completeness of its equipment and the taste displayed in its design. It is 200 ft. long, and at one end is a square tower which rises 85 ft. The style of architecture is suggestive of the Scandinavian. The walls, in some places 3 ft. thick, are of rubble work, reinforced with steel, and contain approximately 3,500 tons of bowlders, all picked up within a quarter of a mile of the site. Not a single stone in the outer surface of the walls, including arches and steps, has been cut or even broken, but each presents the finish given it by nature.

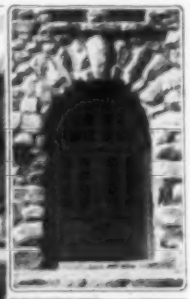
The hatchery proper is a room 45 by 155 ft., with snow-white walls, and is equipped with the most modern scientific apparatus. The superintendent's office and suite, and a handsome guest room, occupy part of the tower, while at the opposite end of the building are living and dining rooms, bedrooms, laundry, kitchen, etc., for the employes. For domestic use and fire protection water is supplied from a higher elevation, while the water for the hatchery is taken from a near-by stream and enters the building through a 12-in. pipe. The institution has been named the Mt. Whitney Hatchery, as that great peak is not many miles distant. Because of its location, it will be able to obtain and propagate some of the finest mountain fish. Its supply of rainbow-trout eggs will be brought on pack horses from lakes 20 miles back in the mountains. It will help stock all the lakes and streams in California, south of the Yosemite National Park.

OLD-TIME HAY STACKERS SEEN IN MONTANA

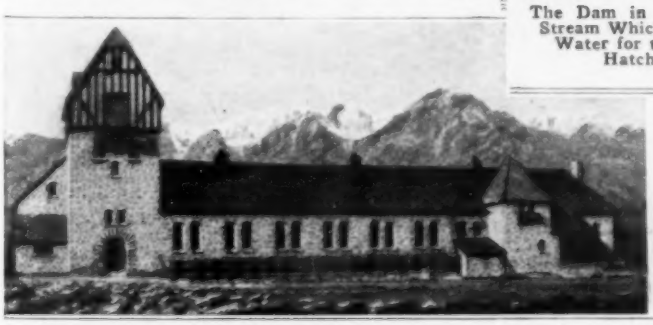
One of the interesting sights that meet the eye of the traveler in Montana is illustrated by the photograph of an old-fashioned hay stacker, taken west of Billings, where many of these antiquated aids to the prairie farmer are still to be found. The picture plainly shows the simplicity of the old method, which was efficient enough in its day, but strikes the observer as odd in the light of modern inventions and agricultural progress. It consists of a wooden framework with a high revolving pulley for hoisting.



The Dam in a Near-By Stream Which Supplies Water for the Main Hatchery



The Main Entrance, Showing How Even the Arches and Steps were Built of Bowlders



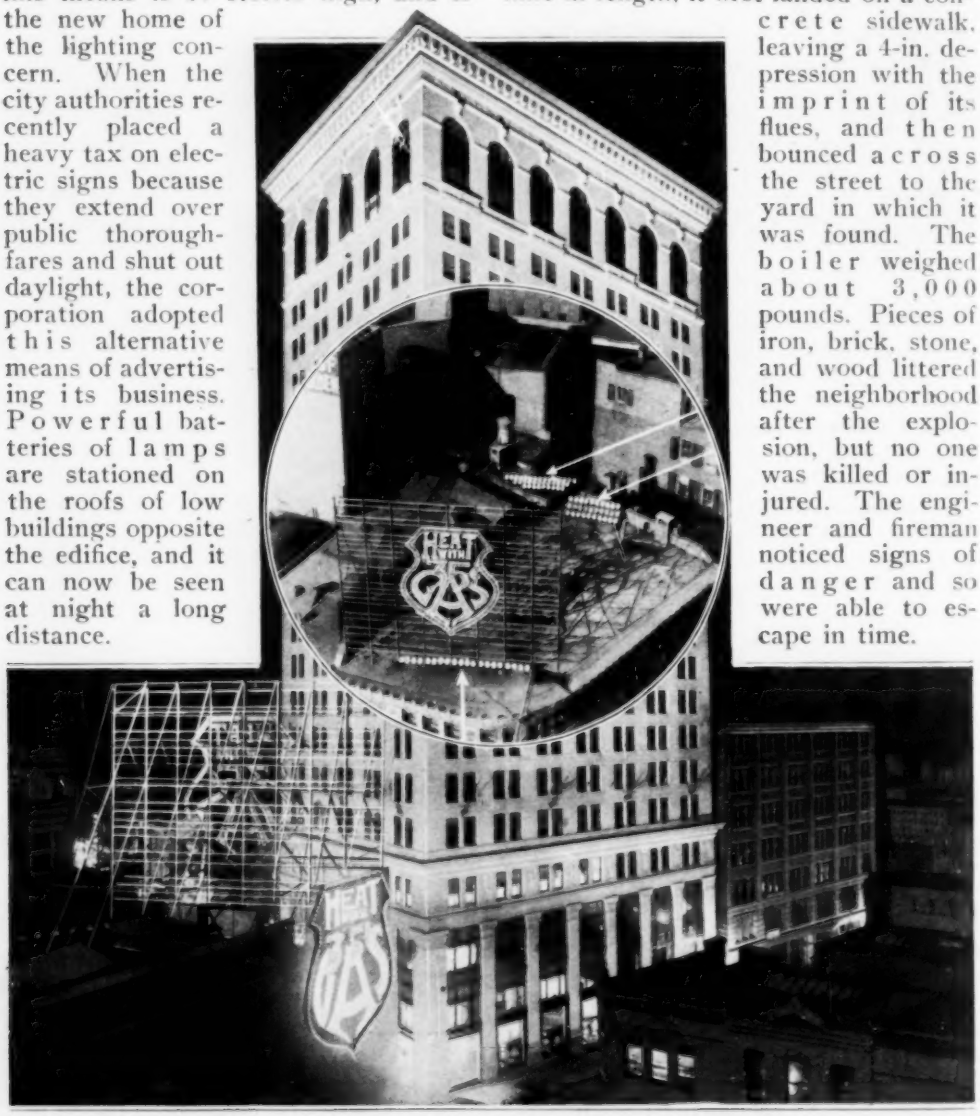
New Fish Hatchery near Independence, California, Which Cost $75,000. Right: The Handsome Square Tower, 85 Feet High, Which Is Suggestive of Scandinavian Architecture

FLOOD-LIGHT SKYSCRAPER FROM ACROSS STREET

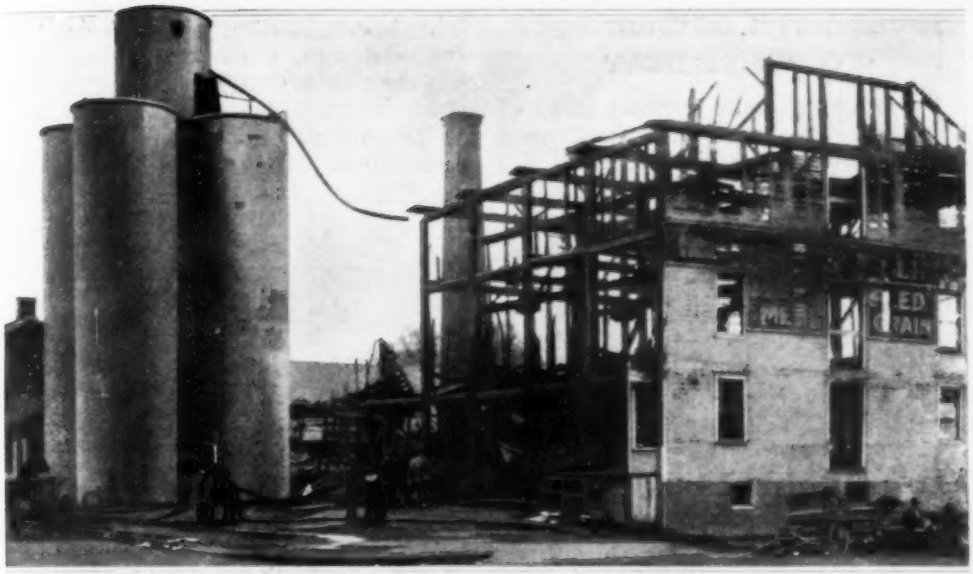
A variation of the ordinary flood-lighting methods, used in many cities to illuminate the outside of tall buildings, is to be found in Baltimore, where an electric-light company has stationed batteries of lamps across the street from the structure illuminated. The skyscraper made conspicuous by this means is 20 stories high, and is the new home of the lighting concern. When the city authorities recently placed a heavy tax on electric signs because they extend over public thoroughfares and shut out daylight, the corporation adopted this alternative means of advertising its business. Powerful batteries of lamps are stationed on the roofs of low buildings opposite the edifice, and it can now be seen at night a long distance.

BOILER BLOWN TWO BLOCKS AWAY BY EXPLOSION

When the 48-in. boiler in an old mill building in Davenport, Iowa, exploded early one morning recently, the entire boiler was blown through the roof of the building to a great height, and brought up against the porch of a residence two blocks away. After describing an aerial arc, estimated at half a mile in length, it first landed on a concrete sidewalk, leaving a 4-in. depression with the imprint of its flues, and then bounced across the street to the yard in which it was found. The boiler weighed about 3,000 pounds. Pieces of iron, brick, stone, and wood littered the neighborhood after the explosion, but no one was killed or injured. The engineer and fireman noticed signs of danger and so were able to escape in time.



Twenty-Story Building in Baltimore Flood-Lighted by Batteries of Lamps Located on the Roofs of Buildings across the Street. Insert Shows Batteries of Electric Lamps and Reflectors Installed on the Roof of a Low Building on the Opposite Side of the Street from the Skyscraper



When the Old Frame Mill Burned, the Concrete Tanks were Enveloped in Flames for More than an Hour. Wheat Stored in Them, However, was Not Injured

BATTERY OF GRAIN TANKS RESISTS GREAT HEAT

In a really striking way, the destruction of a frame building at Coshocton, Ohio, recently demonstrated the fire and heat-resisting qualities of heavy concrete construction. A nest of five grain-storage tanks was erected a couple of years ago against one side of a flour mill. When the latter structure was demolished by fire not long ago, the concrete bins were enveloped in flames for more than an hour. The tank closest to the building was subjected to the most intense heat. It passed through the ordeal uninjured, however, and the wheat contained within it was found to be in good condition when removed the following day.

WHITE QUARTZITE MASS IN RED-SANDSTONE ARROYO

In an arroyo in northeastern New Mexico is a huge mass of quartzite which is of interest both because it contrasts strikingly with the red sandstone which surrounds it on all sides and because of its unusual shape. The natural monument, if such it can be called, rises almost to the level of the arroyo's rim. The white mass is irregularly hollow and scattered through it here and there appears a very dark mineral, chalcocite, slightly oxidized. It is supposed that volcanic activity produced the quartzite from near-by sandstone in ages past, before the arroyo had been formed, and then the softer rock was worn away, while this white, crystalline formation was left standing.

Unusual White Quartzite Formation Standing in the Midst of a Red-Sandstone Arroyo in Northeastern New Mexico

HOUSE WITH DOUBLE ROOF TO RESIST HEAT

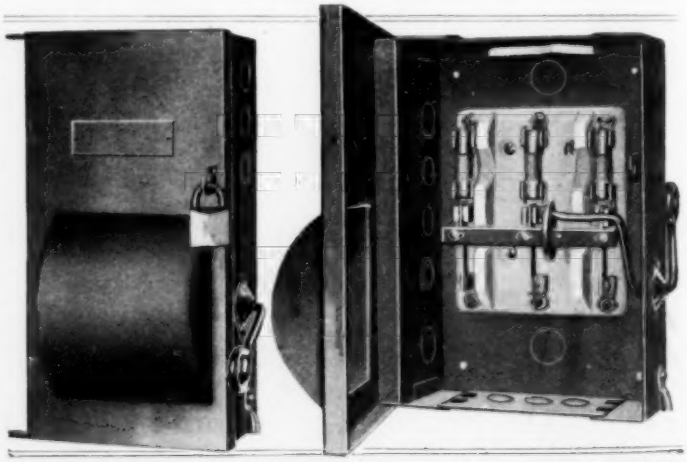
By adopting some tropical ideas of house building, a Florida landowner has constructed on the banks of the Miami River a dwelling that promises the maximum of comfort in summer.

A Javanese Style of Architecture Introduced in Florida: Note the Double Roof and Large Screened Porches on Three Sides

The house is of a simple two-story frame design, with low-pitched roof, but the roof is double, with a considerable air space between, which serves to protect the upper story from the direct heat of the sun. There are also wide two-story screened porches around the house on three sides, so as to get all the benefit of the northeast trade wind which prevails during the summer. The porches are all under the double roof, which has overhanging eaves. This style of construction is common in Java and Ceylon, and is also found in the Panama Canal Zone, but the house on the Miami is believed to be the first of its kind in the United States, as well as the first in Florida.

CRANK-OPERATED SWITCH PREVENTS ACCIDENTS

The special advantages of an inclosed switch, put on the market not long since by an electrical-equipment manufacturer, are that it promotes safety and affords protection against theft of current. This switch is operated by a crank handle that projects through the side of the metal box and connects with the crossbar that unites the various contact blades. An outward bulge in the door provides ample room for the swing up or down of the movable parts when the crank handle is turned. If deemed desirable the door can be locked and, while the switch can be turned on or off at any time, the danger of receiving a shock is eliminated and at the same time the dishonest practice, sometimes followed, of wiring around an adjoining meter, is effectually guarded against. This type of switch is made in a number of sizes.

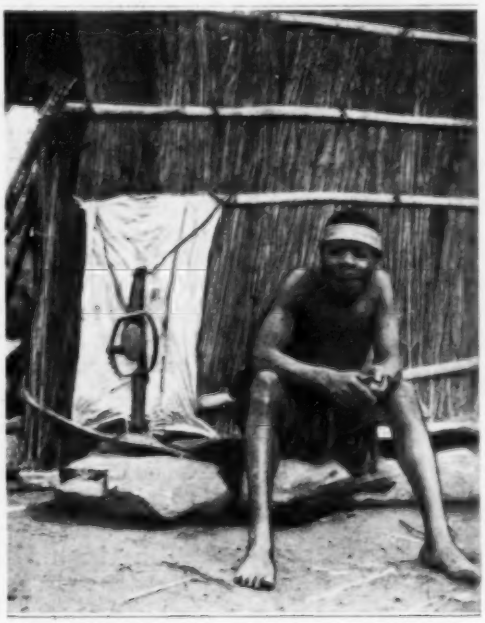


New Type of Electrical Switch Provided with a Crank Handle by Which Connection can be Made or Broken When Door is Locked, Thus Avoiding a Cause of Frequent Accident and Preventing Tampering with the Wires

PRIMITIVE SMITHS' SHOP HAS CRUDE BELLOWS

African Smiths and Their "Workshop": The Two Men at the Rear are Holding the Slender Handles of the Crude Bellows. Stones are Used for Anvils

The American village blacksmith has his counterpart not only in all parts of the civilized world but even among primitive peoples, as the accompanying illustration taken in Angola, in central west Africa, indicates. This crude shop is merely a spot out in the open at which is assembled a collection of the simplest tools. The most intricate device employed is the bellows, the air pipe for which is made of burnt clay and terminates close to the fireplace. A stone holds it in place and at its opposite end are four small air chambers covered with deer or goat skins. Each skin is provided with a slender handle which a blower moves up and down rapidly, producing a rather weak but steady draft, for a comparatively large amount of work. That these smiths often do surprisingly good work is shown by implements they make, such as



Smith in Angola, Africa, and Animal Trap Which He Copied from an American-Made Article, Using Machetes in Making the Springs

hoes, hatchets, knives, etc. Occasionally the men get ideas from the outfits of Europeans and Americans in the region. One primitive metal worker copied an American-made animal trap with success, making the pan from an old hoe and the springs from machetes. With his prized device he has caught considerable game.

MUNICIPAL COFFINS USED REPEATEDLY IN MEXICO

In Mexico many of the poor rent, instead of buy, coffins, and for those who are not even able to pay rental, the municipal authorities supply a casket which is used again and again for such purposes. These publicly owned coffins are merely roughly made boxes with handles at either end. The primitive manner in which one is carried to the cemetery, with its freightage of mortal remains, presents a sharp contrast to the hearse and conveyances that make up a funeral procession in this country. A common practice is for a sturdy, and generally very ragged, peon to carry the burden strapped to his back. On arriving at the burial ground the body is rolled in straw and deposited in a grave, whereupon the wooden box is carried back to the city and held in readiness for the next occasion.

Mexican Peon Carrying a Body to a Cemetery in a Municipal Coffin, Which is Used Repeatedly for Such Services

BIG INCREASE IN POTASH OUTPUT

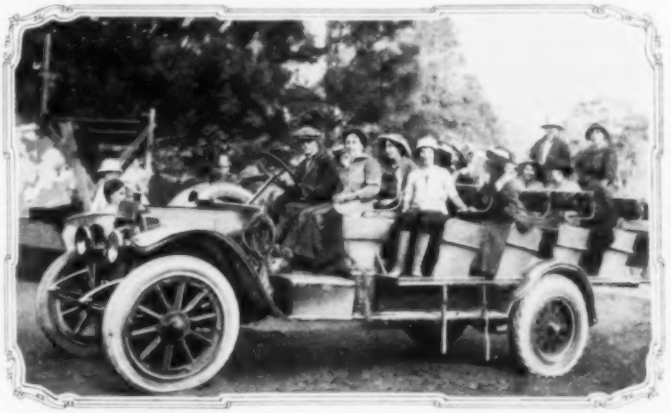
The value of the production of potash salts and potash products in this country in 1916 was 10 times that of the reported production in 1915, according to the United States Geological Survey. Last year the output represented about 10,000 tons of potash, with a net value at the shipping point of at least $3,500,000, figured at prevailing prices. It is predicted that the production for the present year will far exceed the mark already set, for many of the firms reporting in 1916 were only in operation during the closing months of that year. The potash obtained from organic sources is about half that from mineral sources. It is interesting to note that 1,110 tons were produced from kelp, which in recent years has been the subject of much investigation because of the considerable amount of potash that can be obtained from it. The largest output has come from the Nebraska alkali lakes. One of these Nebraska plants was described in Popular Mechanics Magazine a few months ago.

¶ With the aid of motor trucks the picturesque circus caravan is to be revived. A circus has announced that this summer it will tour the country in motor cars.

A PUBLIC PLAYGROUND IN THE HILLS

By ALBERT MARPLE

PUBLIC playgrounds are common—every enterprising city of any importance has them—but the playground camp, located far away in the hills where the clang of the street car and the nerve-racking hustle of business are not known, is new, at least so far as its general use is concerned. Such a camp is now being conducted by the city of Los Angeles. It is strictly a municipal affair, being conducted for the people by the people, the aim being to make it possible for residents of that city, who would otherwise be kept at home, to secure a short stay in the hills at a moderate cost. Although this municipal camp has been in progress for more than five years—this being the sixth summer—it is the only one of its kind in the world, so far as is known. It has passed the experimental stage and is now a regular department of the city's "work."



One of the Big Motor Stages, Loading Up at San Bernardino with Residents of Los Angeles Bound for the Vacation Camp Maintained by Their City at Seeley's Flats in the Mountains

Shortly before this camp was started, one of the boosters of the Angel City conceived the idea of a "city-conducted home in the hills." He took the proposition to the city council and they thought the idea a good one; so good, in fact, that they gave a small handful of money for a sort of try-out. This experiment was in the form of a camp at Balboa Beach, about 40 miles from the city, and so well was that camp patronized that it was decided to con-

The "Bread Line" at Camp Los Angeles: Campers at the City's Public Playground in the Hills Lining Up at Mealtime with Appetites Sharpened by the Mountain Air and the Invigorating Life of a Real Holiday Enjoyed at Small Cost

tinue the experiment over another year. One thing was learned at the first encampment, however, and that was that the great cry was for the hills rather than the seashore, so the following year, San Gabriel, 40 miles from the city, in the mountains, was selected, and for two years camp was conducted at this point. This, however, was not "the" place, so the following year, after an extensive hunt, a 23-acre piece of government land in the heart of the San Bernardino Mountains, known as Seeley's Flats, was chosen, the government giving the city a 99-year lease for $10 per year. No more attractive spot could have been chosen for the purpose. The trees and the foliage are soul-thrilling, not to mention the wonderful trout stream which cuts the valley in two.

A Pool below Heart Rock, in "the Wonderful Trout Stream That Cuts the Valley in Two," near Camp Los Angeles, Where a Permanent Vacation Playground is being Established amid Healthful and Beautiful Surroundings

For three years Seeley's Flats has been the scene of Camp Los Angeles, and so well is it liked that a permanent outing place is being established. The tents which were used the first year have been replaced by modern mountain cabins and every feature which might be considered temporary is rapidly being discarded.

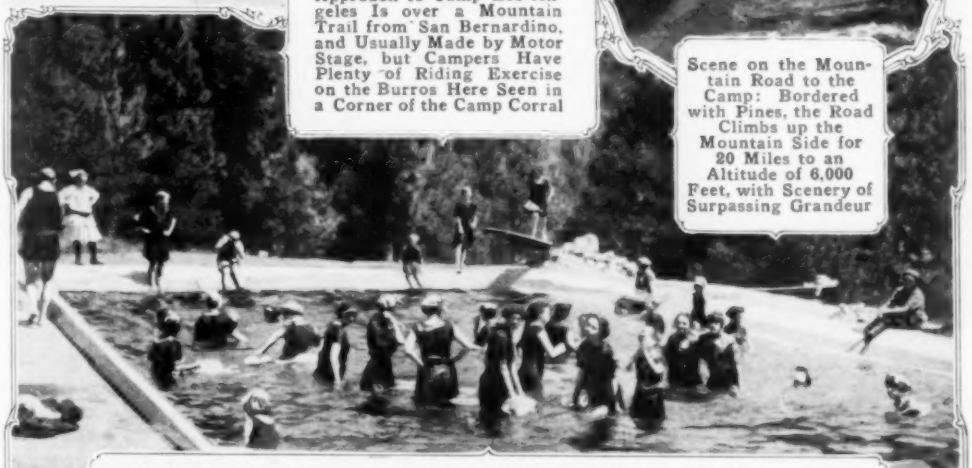
The outing at the camp is remarkable in itself, but the most astonishing thing about these trips is their price to the citizens. For a two-weeks' stay at camp a charge of $7.50 is made, while for the single week $5.50 is charged, these prices including "feed," transportation, baggage—everything. The camp is located about 85 miles from the city. Sixty-five miles of this distance is made by electric car, this being from Los Angeles along the foot of the most beautiful of foothills to San Bernardino, at which place a change is made from the electric cars to immense motor stages. Then the climb up the mountain side is begun. For mile after mile the stages creep along the mountains, ascending to an altitude of something like 6,000 feet in a distance of 20 miles, with the scenery unsurpassed and the mountain air healthful and bracing. At the camp the campers get "three squares" every day, served in cafeteria style in the immense dining room overlooking the beautiful stream and covered by immense pines. One thing is required of the camper every day and that is one hour's work, this being spent in helping to keep the camp clean, or in the kitchen. A trip of this kind to the average camp—and everything at this camp is up to the standard—would cost between $30 and $35 for the two-weeks' outing.

Each of the camp cabins is equipped with sanitary beds, table, chairs, etc. They are grouped a satisfactory distance apart around the main lodge, which is a large rustic affair. This contains a large living room with mammoth fireplace, where the "residents" assemble in the evening for good times; the library, the office, etc. Close at hand, and completely surrounded by trees, is the 50 by 100-ft. new concrete-

Finished Cabins of the Genuine Mountain Type, Built by the City of Los Angeles at Its Hill Playground, 85 Miles Away, for the Benefit and Enjoyment of Citizens of Moderate Means. Everything Furnished Is of the Best, but It Costs Only $7.50 for a Two-Weeks' Vacation Here

Approach to Camp Los Angeles Is over a Mountain Trail from San Bernardino, and Usually Made by Motor Stage, but Campers Have Plenty of Riding Exercise on the Burros Here Seen in a Corner of the Camp Corral

Scene on the Mountain Road to the Camp: Bordered with Pines, the Road Climbs up the Mountain Side for 20 Miles to an Altitude of 6,000 Feet, with Scenery of Surpassing Grandeur



Swimming Tank at Camp Los Angeles, Where the Water Is Always Cool and Refreshing: Far above Sea Level and Many Miles Away from "the Clang of the Street Car and the Nerve-Racking Hustle of Business," the Pool Is Always Popular, Especially When the Girls Are in Camp, as in This Picture, Making Every Minute of the Brief Vacation Count in Building Them Up for the Year's Work

lined swimming pool, the baseball diamond, the croquet and tennis courts, the exercising ground, etc. In order that the handling of the crowds might be facilitated, the campers are taken up in groups. For instance, there are two camping groups of boys, two groups of girls, and four family groups, the stay of each of these parties being of two weeks' duration. Each camper furnishes his own bedding and towels, the laundry being done at the camp. During the past year the camp has been provided with many conveniences, including new sanitary wash basins, flush toilets, porcelain bathtubs, shower baths, stationary washtubs, and so forth.

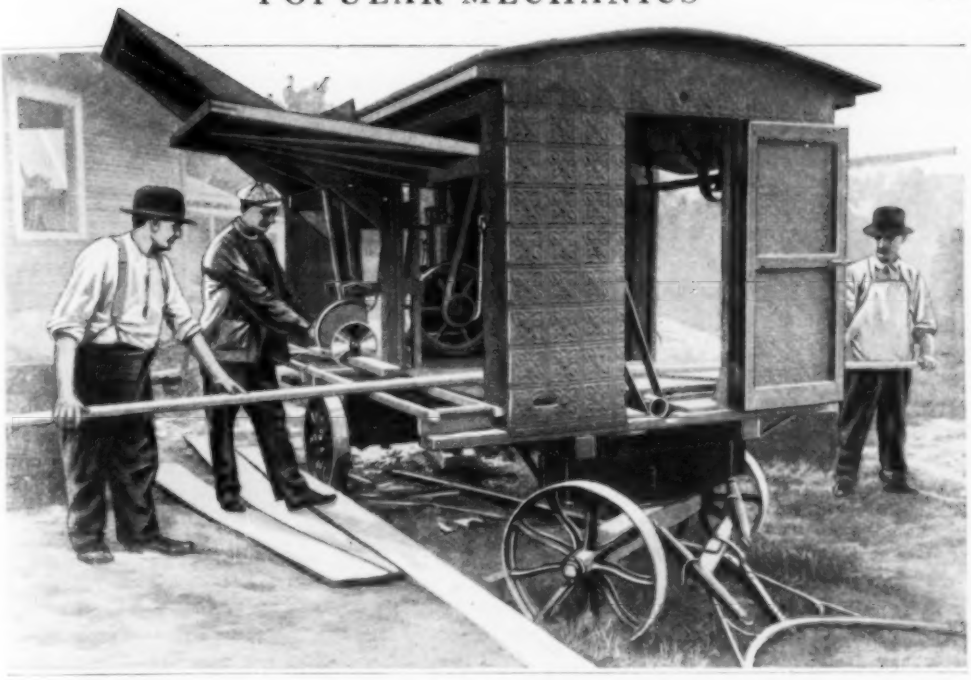
The question which is generally asked in connection with these trips is "How can the city give so much for the money?" The answer is, that the money that each camper pays goes to defray the actual cost of taking him to and from the camp and for the food he eats. The city, out of its public playground fund, which is appropriated yearly for this purpose, has leased the ground and established the camp, this including the buildings and attractions and the construction of the same. This expense comes out of the general income of the city, and is therefore paid for by the entire city. Something like $7,500 has already been spent on this camp. The cost of the paid help in camp is also met by the playground fund, as is the cartage of necessities to camp, etc. So it will be seen that each camper simply pays for what he actually gets, and nothing more.

Nothing that has ever been started by the city of Los Angeles has grown so rapidly as has this playground-camp undertaking. From a mere handful of campers six years ago, the number has grown to a thousand, with prospects of three or four times that number in a year or two. It has been found that the "entrance fee" to camp, although ridiculously small, has been sufficient to keep the camp free from undesirables, who would doubtless have flocked there, were the excursions free.

FARMHOUSE WRECKED BY GAS EXPLOSION

As the household and guests of a farmer living near Elkhorn, Ia., were seated at table recently, celebrating a family reunion, the house was completely wrecked by an explosion in the basement, where an acetylene lighting plant was unfortunately situated. Three persons were killed and ten injured. A leakage of gas had been observed and a repair man had been summoned from a neighboring town to inspect the gas generator. The explosion occurred as this man opened the basement door, his dead body being found near by. It was believed that the accumulation of leaking gas was ignited from the kitchen fire, when the open door permitted its escape. The explosion furnished an additional argument for the location of such plants outside residence buildings.

This Farmhouse Wreck was Caused by an Explosion of Leaking Gas from an Acetylene Plant in the Basement, Three Persons being Killed



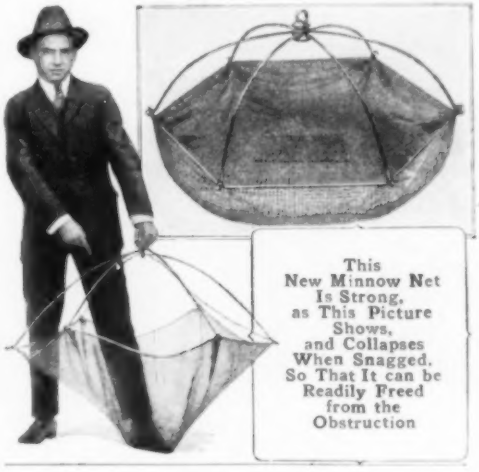
Workshop Mounted on Wheels and Containing a Two-Horsepower Engine, Ripsaw, Sandpaper Drum, Planer, and Other Equipment Usually Found in a Carpenter Shop

PORTABLE CARPENTER SHOP SAVES BUILDER'S TIME

A carpenter shop on wheels, constructed by a Brookfield, Mo., contractor, enables its owner to save much time, because it can be used right at the scene of his building operations. The structure is mounted on a low running gear and is provided with a 2-hp. gasoline engine, a ripsaw, an 18-in. sandpaper drum, a planer, groover, etc. Sections of the sides are hinged so that they can be drawn out and upward and made to serve as awnings. The shelter can be securely locked and furnishes ample protection against the weather.

MINNOW NET FREES ITSELF IF SNAGGED

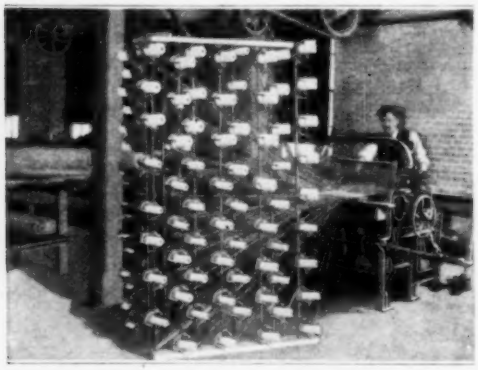
Fishermen who use minnows as bait can now obtain a minnow net with several new features, among which is a device to free the net easily in case of snagging. It is a folding drop net of the basket type, with a frame made of six spring-steel rods. When the net is snagged, or under extraordinary strain, the rods bend inward and downward until all but one of the rings by which the net is attached slip out of open hooks at the rod ends, the frame collapses, and the net is freed. A pocket for bait to attract the minnows is at the bottom of the net, and the little fish when netted can be removed without handling.



This New Minnow Net Is Strong, as This Picture Shows, and Collapses When Snagged, So That It can be Readily Freed from the Obstruction

MAKING AND CURING TIRES BY A NEW PROCESS

Automobile tire casings are made in one continuous mechanical process by

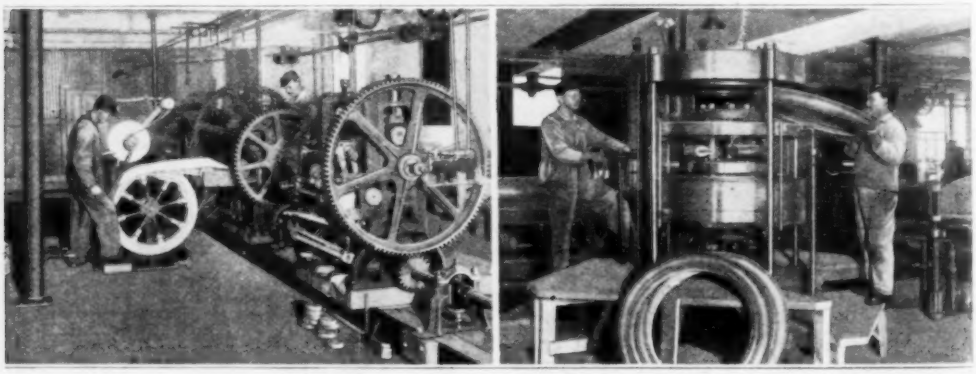


This Loom Weaves the Fabric for a Tire Casing, Making It the Exact Shape and Width Required

a method of recent invention, which includes the weaving of the fabric that forms the base of the tire, impregnating it with rubber in a special friction calender, forming it to the required shape, and vulcanizing. This method, employed in a Rhode Island factory, is said to be the only one that makes the loom and the calender parts of a continuous process. The first operation is to weave the fabric in strips, the desired width and shape for the casing. The strip is next passed through the calender and impregnated with rubber; the wires, or rubberized cords, to form the beads are laid in place, and the edges of the strips are folded up over the beading of each ply separately, giving each layer of fabric its own individual lock. This operation of frictioning and making the carcass of the tire takes only five minutes for a six-ply casing. The cushion, breaker, and outside rubber-tread stock being then put on, the casing is ready for vulcanizing in a hot mold, which takes from 10 to 15 minutes, according to size. The time required for the whole process is about 30 minutes.

MOST POWERFUL TELESCOPE SOUTH OF THE EQUATOR

The most powerful telescope in the southern hemisphere, ranking as the third most powerful in the world, will soon be completed at the national astronomic observatory, Cordoba, Argentina. It is of the reflector type, with an aperture of 61 in., and will be mounted in a steel dome, 59 ft. in diameter, situated 3,937 ft. above sea level in the Sierra Chica. A special road has been built to the site. The great mirror and its auxiliaries are being ground in optical shops attached to Cordoba Observatory for the purpose, the disks of glass required having been imported from France just before the war. The large disk was 10 in. thick before grinding and weighed 2,315 lb. The telescope will be used mainly for photographic observations.



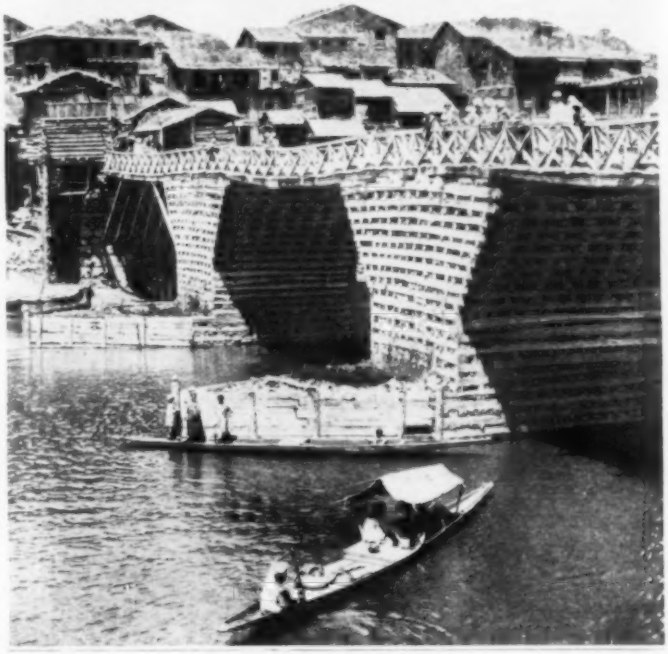
Making Tires by a Continuous Process: At the Left, Building Up the Carcass with Fabric as It Comes from the Calender. Right, the Tire Press Mold, Where the Tire is Vulcanized over an Electrically Heated Core

MOUNTAIN FOLK MAKE PLANS FOR PICTURESQUE FROLIC

If plans now being made by the year-around residents of the Estes Park region in Colorado are actually carried out, the first of a series of annual autumnal festivals in some grassy vale of the Rockies will be inaugurated next fall. The district has a permanent population of 400 or 500 persons, and these — men, women, and children—will go in a body to a group of big, rambling log buildings which are to be erected in one of the animating spots far up in the bosom of the continental divide. There, within easy reach of perpetual snow, skiing, tobogganing, and other rejuvenating sports will be enjoyed. For three weeks the whole colony will devote itself to outdoor play throughout the daylight hours, and to the good-fellowship of roaring fireplaces, the companionship of music, and the merriment of dancing, during the long, crisp evenings. A number of years ago the pioneers of the region banded together and went into the mountains late in September for a big, jolly camping expedition. Of late, however, this custom has not been observed, for the increasing popularity of Estes Park as a summer resort has kept the residents busy each fall enlarging their facilities to meet the demands of the next season's tourists. There is no longer need for this, and so the townsmen plan to have a real neighborly frolic in the autumn after the crowds of tourists have departed to their homes in different states.

PRIMITIVE TIMBER BRIDGE IN NORTHERN INDIA

An example, both curious and instructive, of primitive bridge building is to be found in the Vale of Cashmere, high up in the Himalaya Mountains of northern India. This large structure is constructed almost entirely of roughly hewn timbers and is supported by large piers made of cribbing, filled with stone or riprap at least to the point where the corbeling of the supports begins. This slanting of the sides serves to narrow the gaps between the piers so that single timbers are long enough to extend from one to the other and thus support the floor of the structure. Each pier is provided on its upstream face with a cut-



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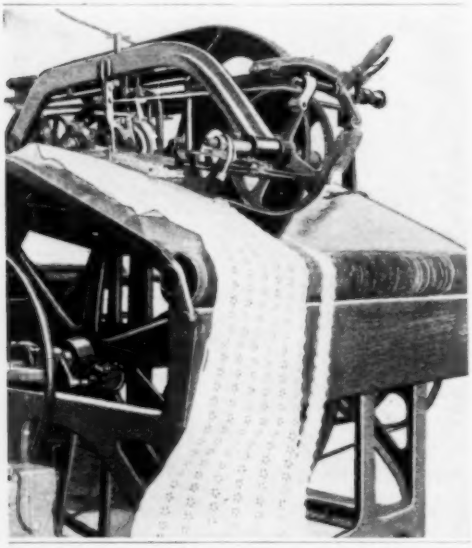
Picturesque Primitive Structure in Cashmere, India, Which Offers Suggestions in Bridge Building for Remote Regions in America

water, or sharpened point, filled with stone, thus materially adding to the stability of the supports in case of flood.

SCALLOP-CUTTING MACHINE FOR EMBROIDERY

Strips of embroidery are now cut with the familiar scalloped edge from the embroidered fabric by a machine of



Cutting Embroidery Strips by Machine: This Swiss Invention Does the Work of 50 Persons Operating by Hand

Swiss invention. This was formerly done by hand and each machine will do the work of 50 persons, its capacity being about 12,000 yards a day. The fabric to be cut is drawn under a knife, 36 in. long and ½ in. wide, by a wide belt run over two pulleys, the under side being in contact with a large wheel which gives proper tension to the cloth. The machine is operated by a small electric motor, and the knife is removable for resharpening. As the strips of embroidery are cut off they are wound upon cartons ready for sale.

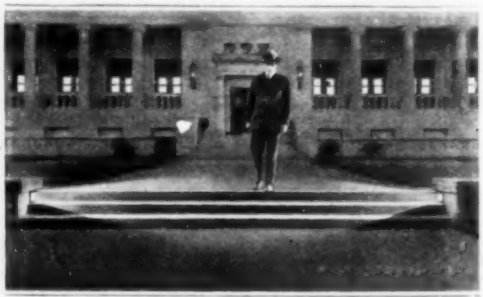
¶The Cuban government has been engaged in constructing a canal 32 miles long in the province of Matanzas which will reclaim a large and very fertile area.

NEW FUELS USED IN SPAIN TO REPLACE COAL

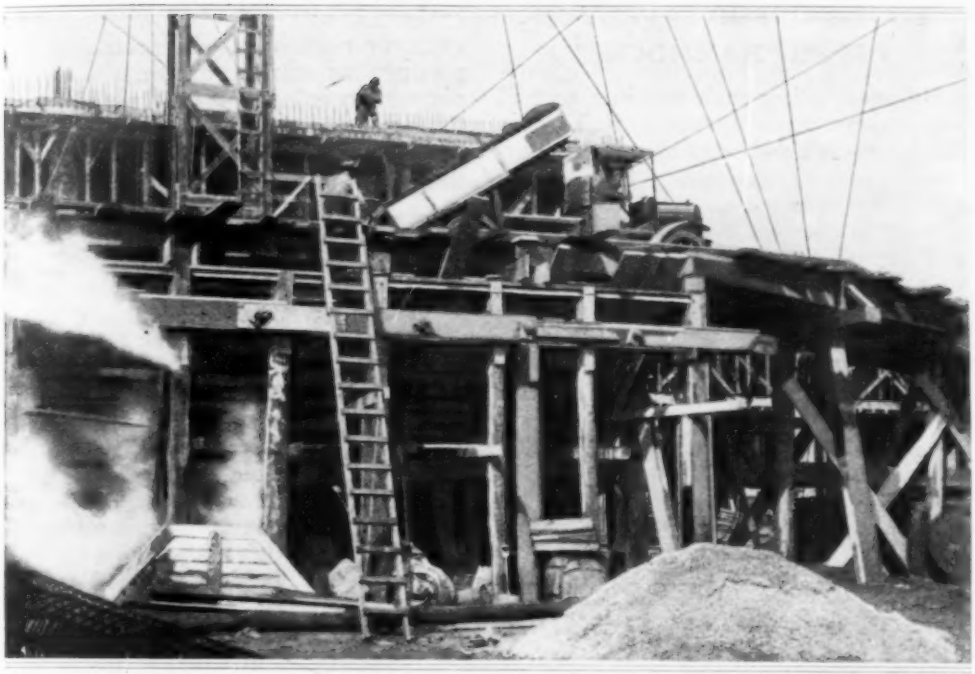
Shortage of coal in Spain has led to experiments with various substitutes, including the husks of rice and inferior qualities of lignite. In the provinces that raise rice, the husks have lately been mixed with tar and formed into briquettes under hydraulic pressure. In their natural form rice husks make an expensive fuel, burning with little heat, but the briquettes are said to ignite readily, give off little smoke, and can be used to some extent as a substitute for coal. Another kind of fuel briquette, giving similar service, is made from cheap qualities of lignite, including lignite dust and waste formerly regarded as worthless, from which the volatile matter is first expelled and a binding material then added to form the briquette under pressure.

HIDDEN BULBS ILLUMINATE SIDEWALK STEPS AT NIGHT

In front of the public library of Alhambra, Calif., is a flight of three steps at the juncture of the street and library sidewalk, which is ingeniously illuminated by concealed lights so that the difference in walk levels may not be the cause of accident to pedestrians. The electric bulbs are recessed in the low stone abutments at each end of the steps and are covered with frosted glass. Strong reflectors aid in making the flight particularly prominent in the dark.



Three Steps in Front of the Alhambra, California, Public Library Which are Well Illuminated at Night by Lights Recessed in Stone Abutments Either Side of the Walk



Platform on Second-Story Level from Which Trucks Dumped Their Contents into a Bin Below, Thereby Saving Much Labor in the Handling of Building Materials for a $500,000 Concrete Structure

LABOR-SAVING PLAN FOR UNLOADING MATERIAL

An elevated platform, approached by inclines of a 10-per-cent grade, served as one of the simple but effective labor-saving arrangements used by contractors in erecting a new $500,000 concrete building in Cleveland, Ohio. Instead of dumping gravel, and the like, on the ground, each loaded truck was driven onto this platform, and its contents dumped into a bin below. From this container, which served as a hopper, it was an easy matter to transfer the material to mixers, or handle it for other purposes, with a minimum of labor.

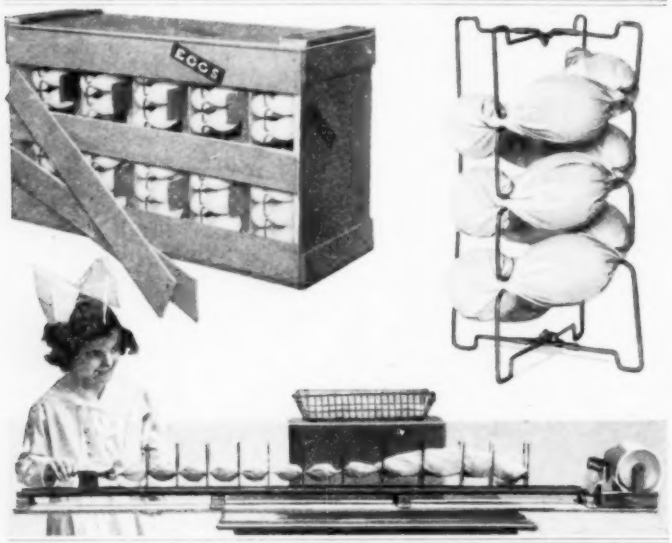
CONCRETE FARM BUILDING OF ARCHED-ROOF TYPE

In using concrete as a building material for sheds, one-story barns, etc., it has been found that an arched-roof type of structure is desirable. A good example of a building of this character is to be found on a large farm near Eddyville, Ia. It is 72 ft. long, and its side walls and roof form a continuous arched wall of concrete. The ends are of tile. In building this structure the form was made chiefly of 1-in. native lumber, the material being bent while green. The concrete poured over this form was reinforced with fence wire. The wooden lining has not been removed but serves to strengthen the arched roof, which has been partly covered with earth. A portion of the building is used as a garage in winter, but most of it is used for handling fruit and for storage purposes.

Farm Building, 72 Feet Long, with Barrel-Arch Roof of Reinforced Concrete. The Wooden Form for the Curved Portion has been Retained to Give It Added Strength

EGGS SHIPPED SAFELY IN PAPER "HAMMOCKS"

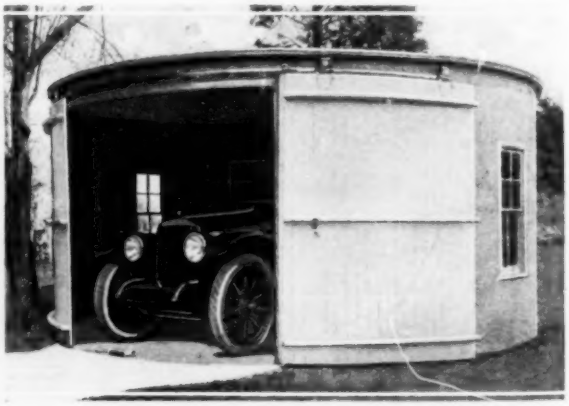
By suspending each egg in a sort of paper hammock, a Syracuse, N. Y., firm has hit upon an inexpensive and apparently safe means for shipping eggs by mail, or otherwise. In preparing the product for transportation, a wide paper ribbon is laid out on a special rack having a dozen divisions, in each of which an egg is placed. The paper is then twisted by means of a crank and clasp attached to the end of the strip. The wrapper is dampened before being twisted and so binds closely about the eggs, making a sausagelike string which is wound around a four-cornered wire reel. The reel holds the eggs in such a way that no two touch. As the wrapper dries it shrinks and holds its contents firmly in place and also serves to keep the eggs fresh by protecting them from the air. One or several reels can be shipped in a suitable case.



Above: Crate Filled with Eggs in Paper "Hammocks" and a Single Reel with a Dozen Eggs. Below: View Showing How Eggs are Wrapped

SILO FORMS USED FOR ROUND CONCRETE GARAGE

A circular concrete garage has recently been built in Republic, Mo., in the construction of which 16-ft. steel silo forms were used. The concrete walls are 4 in. thick and the roof 3 in. thick; the whole structure forms one solid piece of concrete. Special reinforcing was used. The roof has a rise of 3 in. to the foot and is painted with black concrete paint, while the inside of the structure was washed with a brush coat of cement. Under the 4-in. eaves is fastened the curved track on which are hung the two doors which themselves are curved to conform to the walls. The structure is fireproof except for the wooden doors and window frames. The entire cost of the garage was about $150, including a concrete floor. The circular form affords convenient work room either side of the car, and three windows furnish plenty of light.



A Circular Garage Made of Concrete with the Aid of Steel Silo Forms: Built as an Experiment, the Cost was Found to Be Small and the Effect Pleasing

STREET CLEANERS TAUGHT TO CLEAN

By C. L. EDHOLM

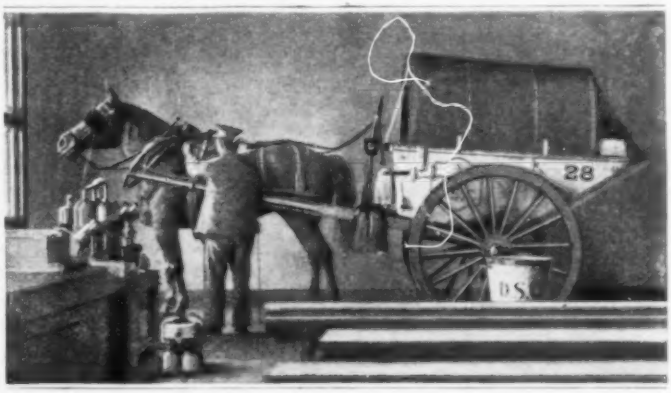
DON'T imagine that anybody can start out with broom and bucket to sweep the streets and do it right. For many years the city of New York thought that willingness to work was all that was needed to make a good street cleaner, but now it knows better, and therefore a school has been established to teach the "white wings," the drivers, the flushers, and the chauffeurs of the garbage tractors the how and why of their business.

This school was established only a few months ago in the dumping-dock building at the foot of East Nineteenth Street, where a hall, about 40 feet long and half as wide, was devoted to that purpose.

The equipment of this classroom consists of the articles used in cleaning streets, including a regulation ash wagon with a full-size model of "Teddy," the prize horse of the department, hitched to it. Teddy carries a set of standard harness and blanket, and one of the features of the course of instruction for drivers is thorough drill in "hooking up." The need of such teaching is apparent when it is understood that men who have never handled horses may be required to act as drivers for the carts that contain the city's waste. So "rookies"—men who have been taken on after passing the preliminary examination — are required to put the harness on the dummy and take it off, time after time, until every movement is done with the precision of military drill. The reason for every move is explained to the new men, so that they will not think that the carefully considered regulations are mere arbitrary orders.

As a matter of fact, each detail is important, as it may have far-reaching results if ignored. For instance, in laying aside the harness the pad that lies between the animal's withers and the saddle is not to be thrown on the ground but tucked under the arm as the driver removes it. The rookies are told the why of this: a bit of gravel might lodge in the pad if it were thrown on the stable floor, and then, when it came in contact with the horse's back, could wear a raw spot in a single day, and the animal would be laid off until healed. Special instructions for fitting the collar, bridle, and other parts, are given, so that the horse may work without undue strain. Even the business of hanging up the harness on the stable hook is taught, so that the man who oils and cleans the leather can handle it without confusion.

The course includes a bit of veterinary instruction. The common ailments of the horse are described, and the driver must know by the symptoms when his equine helper is suffering from colic or overheating; and he is taught first aid in relieving the animal when it becomes sick in the streets, or when it falls. Also, the men are shown how to avoid such mishaps.



New York Street-Cleaning Recruit Learning How to Harness a Horse Properly, in the Training School for "White Wings," Which is Equipped with a Dummy Horse and a Standard Ash Wagon

How and what to feed the horse, when to give it water, and similar details, are not left to guesswork, but are taught in the lectures. As the welfare

of the horses is vital to the street-cleaning department, the men are carefully warned against allowing their horses to drink from public troughs, where they might acquire glanders and spread the contagion to a thousand others in short order. One of the common errors — that of allowing the horses to nibble at the green garbage at the dumps—has received attention. The drivers are cautioned that this apparently good-natured act, in allowing the creature to eat an apple or some vegetable tops from the garbage, might cause colic or even poisoning, as disinfectants are often sprinkled in the cans.

The details were formerly learned by experience, and the result was loss of stock, delay, and confusion. Now, in addition to his book of instructions, the driver receives lessons in class, and has to answer correctly the questions about his work, and demonstrate that he understands, by going through the drill.

Instructor in the Street Cleaners' School Correcting a Common Error: The Street Flusher must Not Bend the Hose in Turning Down the Nozzle, as It Tends to Break the Rubber

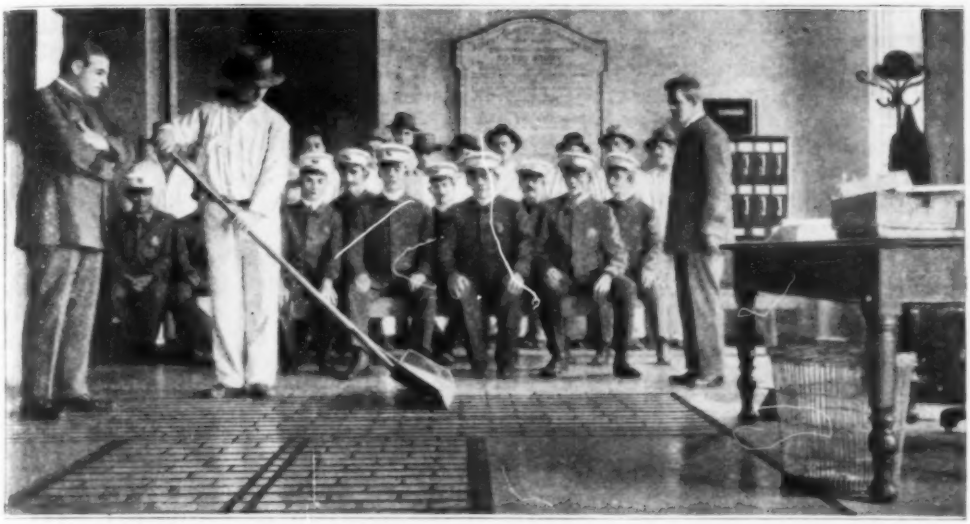
The officers of the department gather in the hall once a week for lectures on the best methods of doing the work, and at the same time, while a squad of officers occupy the rear benches, a class of new men occupy the front rows and watch the instructor put one of their number through a demonstration exercise.

The advantage of this method is that the rookies get the benefit of the theoretical training, and realize the magnitude of the work in which each plays his small part. This gives the intelligent manual workers a chance to study the intricate problem of keeping a city clean, and enables the best men to work up to responsible places as officers.

Another advantage is that the superiors, who have learned by experience only, may keep up with the times and follow more scientific methods. Many a gray-headed officer is allowing his men to waste time and energy by doing the work as the veteran did it when he was at the business end of the broom. Now there is a wrong way and a right way to perform such a simple task as sweeping a street, and some of the men in charge of a district are learning the best method at this late day through the demonstrations in class. It might cause friction and hard feeling were the instructor to take one of these veterans aside and tell him that his practice was wrong; the effective method is to take a group of officers and show them the approved method.

The demonstration floor is painted in gray and black, to represent a section of a city street. A street-car track with cable slot is shown, a street intersection, with the courses of paving block laid at angles, also manholes and sewer openings.

On this realistic bit of pavement the new man is placed with his broom and scraper, and as he does the work of sweeping it, he tells what he is doing and why. For instance, he states that he sweeps away from the cable slot, in order to avoid filling it with dirt, and that he never pushes a pile of sweepings across it. The length and direction of the stroke, and the posi-



New York Street Cleaners' School in Session: The Floor is Painted to Represent a Street Pavement, with Car Tracks, Cable Slot, and Gutters. A Demonstrator is Showing the Class How to Use the Scraper Properly

tion while sweeping, are all taught, and the rules are enforced.

Most of the rules are intended to secure greatest efficiency; some to prevent annoyance to the public, and others to safeguard the men. Among the latter is the regulation always to work facing the traffic, so that there may be no danger of being struck from behind by a vehicle. This is a simple precaution, but one that few green men would think of. Another safety rule is that the scraper, while being pushed along the gutter, must be held to one side of the body, never against the abdomen. The reason is that if the scraper should hit an obstruction, the body would receive a shock from the end of the scraper handle that might cause rupture. Here again is a detail that a beginner would not think of until he had been jolted once or twice.

Among the other equipment of the hall is a hydrant and flushing outfit, hose, nozzle, and reel. The instruction gives in detail the correct method of preparing to flush the street, of extending and reeling up the hose. The cost of the apparatus is emphasized, and as a couple of men are in charge of equipment worth nearly a hundred dollars, it is a point worth making. The hose costs 54 cents a foot, and the flushers are shown how to avoid undue wear and breakage. The portable reel on its wheeled carriage is set at a convenient point near the hydrant and in a position where a passing truck cannot smash it. The demonstrator was asked, "Why do you lay the nozzle on the street when you are through? Why don't you drop it?" And he replied that brass nozzles cost a lot of money, and it was part of his job to handle them carefully.

Even the correct position of the nozzle, while flushing a street, is insisted on. Too great elevation weakens the force of the flow, and it descends as spray on the pavement, while too great depression causes the stream to hit the street with force that is destructive to the pavement and is not effective in cleaning the surface. Even such a detail as turning the stream away from vehicles is not overlooked. The instruction is to divert the stream when the approaching vehicle is about 20 feet away, turning the hose toward the gutter and putting a finger over the nozzle to throw down a fan-shaped spray. Uninstructed flushers had the bad habit of holding the stream across the street until the last moment, and then bending the hose sharply to cut off the flow, causing breakage of the hose.

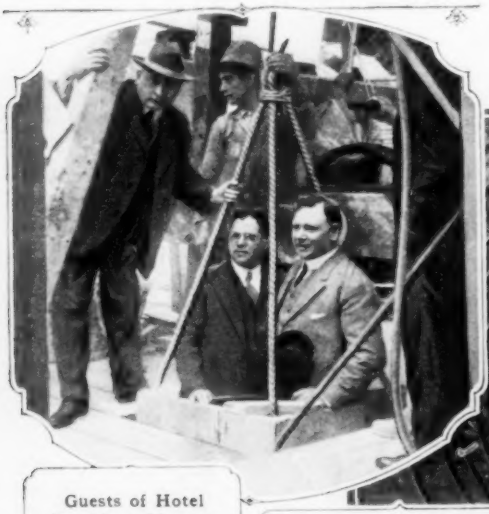
The men who apply for positions as sweepers, flushers, and drivers have, as a rule, little education and many of them are foreigners. Most of them would muddle through the day's work in some fashion, but under the present system the recruits are as well fitted for their duties as the experienced workers.

In addition to the simple equipment of cart, brooms, and scrapers, the classroom contains a complete motor of the type used in the garbage tractors. In a certain section of Manhattan, known as the model district, 12 of these huge machines are in operation, and as they cost $7,500 each, it is essential that the drivers should be experts. Therefore the course in this school gives the thorough instruction in motor mechanism that a first-class automobile school gives its paying pupils. Not only the present drivers are taught, but applicants as well receive the course. Thus a large waiting list is kept, from which new drivers may be appointed when required.

It should be added that the training given by the street cleaners' school is not confined to the classroom. The men are taken out on the streets and given practice work under the supervision of officers before they graduate, and the result is that the new men do not have to be broken in when they are assigned to regular work.

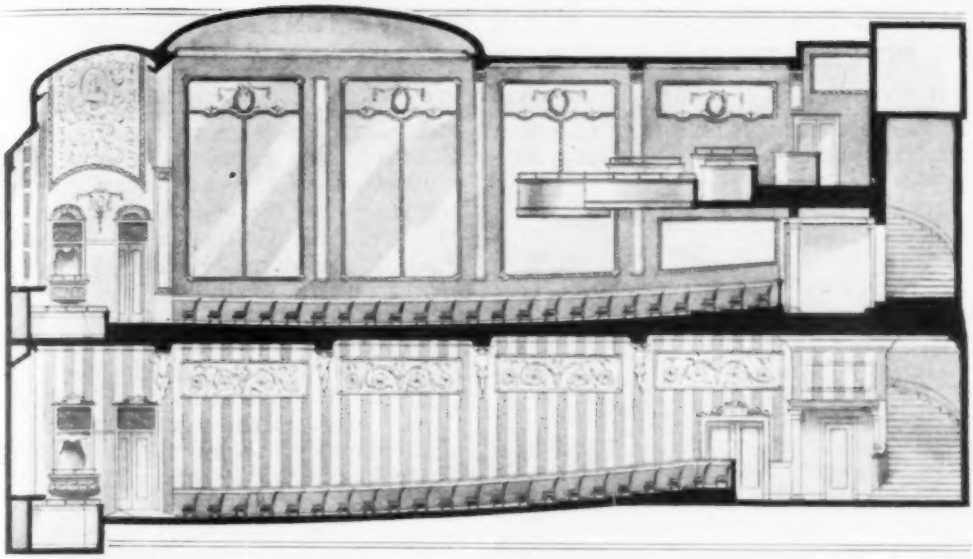
DINNER SERVED AT BOTTOM OF SKYSCRAPER CAISSON

A dinner at the bottom of a 110-ft. caisson was the unusual feature which marked an early stage in the construction of the second half of a new Chicago hotel. The shaft was 10 ft. 2 in. in diameter and extended down through various strata of earth to solid rock. The dinner at the bottom of this vertical tube was given by the president of the hotel company, who invited as his guests the mayor of the city, the chief of police, and 10 other prominent persons. A special cage was built to carry the diners to and from the richly laden tables, which rested on bedrock. Two pipes were used to keep the air in the well pure. Immediately following the meal the host deposited a tube in the bottom of the shaft, containing



Guests of Hotel President About to Descend to the Bottom of a 110-Foot Caisson, Where a Dinner was Served

View Looking Down into the Caisson, Showing the Dining Tables and Guests Standing on Bedrock



RICHARDSON & YOST, ARCHITECTS
Sectional Plan of New Dual Theater Building, Cleveland, Built with Entrances from Streets of Different Levels: The Same Moving Pictures are Shown in Both Houses, Beginning at Different Times for the Convenience of Patrons

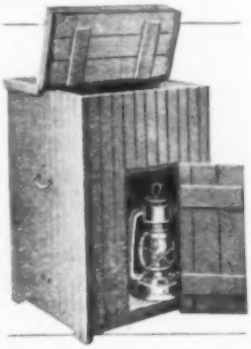
data regarding the hotel and the dinner, together with appropriate photographs. When this formality was over, the shaft was filled with concrete. There are 12 of these supports under the new section of the hotel, which will be 21 stories high.

DUAL THEATER CONVENIENT FOR ITS PATRONS

In Cleveland, Ohio, there is a dual theater building, designed with a complete motion-picture theater on each of its two stories, and believed to be the only playhouse of its kind in the country. It is situated on property that lies between two buildings fronting on streets—one of them Euclid Avenue—that have 11 ft. difference in their levels. A passageway, treated as a theater entrance and lobby, was therefore provided by the architects on the lower street level, leading to the lower theater, which seats 600, with a stairway to the second-story auditorium, which has a balcony and seating capacity for 750. The upper house also has an entrance from Euclid Avenue, the higher street, making it possible to enter either theater from either street. The same program is given in both houses, a film picture being started in one from half to three-quarters of an hour before it begins in the other.

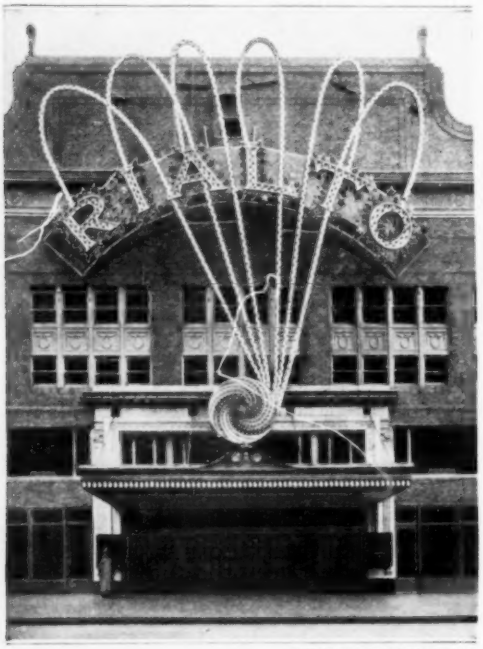
EASILY OPERATED BROODER FOR LITTLE PIGS

An inexpensive brooder for little pigs, consisting of a substantial wooden case having a door in the top and another in one side, has recently been patented by a Wisconsin farmer. The box is divided into an upper and a lower compartment by a perforated sheet of metal which serves as a floor for the upper chamber. The latter is heated by placing a lighted lamp or lantern in the lower half. Young pigs requiring special care are wrapped up and placed in the top compartment, and in this way chills, which sometimes prove fatal, are avoided. Handles are provided for moving the brooder about.



NOVEL ELECTRIC SIGN MADE FOR EASTERN THEATER

Erected on the front of a new theater in an eastern city is an illuminated sign that has a distinctive, if not new, feature. The name of the theater appears in large letters arranged in the form of an arc. Below, a wheel studded with varicolored lamps revolves rapidly and apparently shoots out streamers that "burst" rocketlike over each of the several letters, which immediately thereafter are illumined. The unusual phase is that a loud hissing noise, like that of an ascending skyrocket, is to be heard as each streamer flashes up from the spinning wheel. This is produced by a special contrivance that allows compressed air to escape.



COURTESY AMERICAN EXPORTER

A Pyrotechnic Effect Accompanied by a Loud Hissing Sound, like That of an Ascending Skyrocket, is Produced When This Electric Sign Is in Operation

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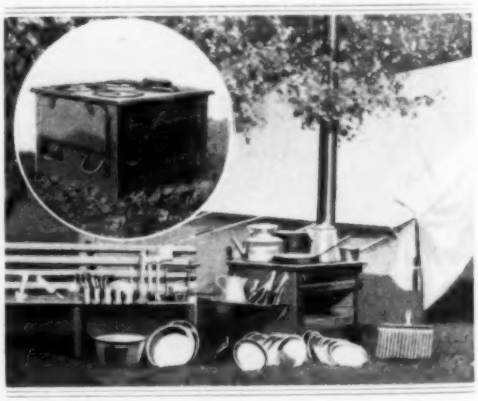
¶ The Pacific coast delegates to the national advertising convention, to be held in St. Louis this summer, plan to make the trip from the West in automobiles, following the Lincoln Highway as far as Omaha.

MOVEMENTS IN THE EARTH UNDER A RESERVOIR

Scientists took advantage of the construction of a huge reservoir in New South Wales recently to study the movements of the earth's crust under the weight of the 30,000,000,000 cu. ft. of water which is its storage capacity. Special pendulums were hung in deep shafts dug in the hills which inclose the reservoir, the latter having a height of 236 ft., and the instruments connected therewith have already recorded earthquake movements and dislocations, also earth tides and other phenomena due apparently to the great water load.

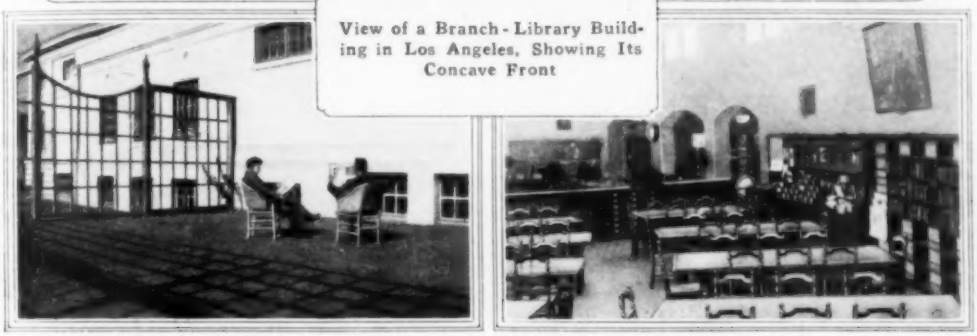
PORTABLE CAMP STOVE AND KITCHEN KIT

When one goes camping, the question of a cooking outfit is all-important. A Chicago lover of outdoor life has decided the question for himself by the invention of a camp stove that may be packed with all the dishes and utensils necessary for a party of 12 persons, and weighs complete about 90 pounds. The stove is 24 by 26 in. on top, with four 8-in. holes, burns wood, and has a hearth that lets down. Seven feet of tapering stovepipe are stowed in the fireplace, with four stove legs, poker, and lid lifter; while in the oven over 100 articles of table and stove ware may be nested.



Portable Stove and Kitchen Outfit for a Camping Party: In the Insert the Stove is Seen Packed

View of a Branch-Library Building in Los Angeles, Showing Its Concave Front



Left: The Outdoor Reading Room, Photographed Before the Trellis was Covered with Vines.
Right: View of Interior of Main Reading Room

CURVED LIBRARY BUILDING HAS UNUSUAL FEATURES

A beautiful branch-library building, recently opened in Los Angeles, is of unusual interest because it is built in the form of a curve which describes an arc of 90°, with the concave side facing the intersection of two streets. This odd shape is especially suited to the location and permits the equipment to be arranged in a way that makes the best use of the floor space. The front wall is 105 ft. long, while the corresponding rear curve is 147 ft. long. This curved portion is 27 ft. wide and 22 ft. high, inside. At the rear is a rectangular extension containing several rooms, including a rest room for the staff which is furnished with an electric cookstove and a sanitary food cabinet. Adjoining this extension is a vine-shaded arbor, or outdoor reading room, which is a most attractive feature. In the basement are a good-sized auditorium, a heating plant, and store rooms. The building cost $34,000, and is furnished largely in old English oak. At present it houses 15,000 volumes.

RUBBER SHOES PREVENT SLIPPING OF TRIPOD

Rubber tripod shoes, now being manufactured by an English concern, are intended to be used when a camera is set up on a smooth floor, or other slippery surface. It is a not uncommon experience of a photographer to find that a slight jar has thrown his camera out of focus because the tripod slipped about easily. These rubber shoes, which can be stretched over the end of a tripod leg of any shape, are intended to prevent just such accidents. When not needed they can be removed.

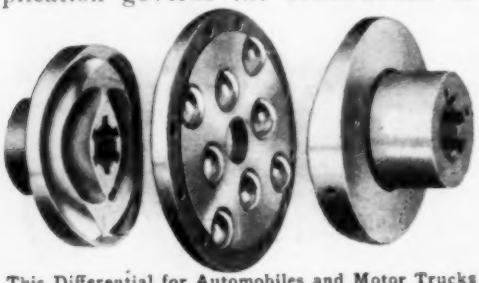
MECHANICAL DEVICE FOR KEEPING BOOKS

A bookkeeping machine now on the market might almost be said to do bookkeeping mechanically, for it produces work which is wholly free from mistakes in addition and subtraction, and saves a great amount of time by performing several mathematical operations at once. It is a combination of an adding machine and typewriter and has special features in addition. A description of one style of this machine and how it is used in posting a ledger will illustrate, in a general way, what the invention does. The device is operated like a typewriter and is mounted on a suitable standard over a flat platen, on which is placed the sheet containing the account to be posted. The operator first writes the last balance in the old-balance column and then the debit and credit items are recorded in their proper places. While the sums are being written they are also being added to the totals on registers corresponding to the various columns, so that the operator can see at a glance what the totals are. Simultaneously with these operations a special device, called the cross-footing register, adds the debits to the old balance and subtracts the credits, so that as soon as the entries have been made the balance is calculated automatically and all that remains is to record it. When this is done the cross-footing register is cleared, thereby proving the work.

A Machine with Which All Bookkeeping Entries are Made, Which Not Only Adds Several Columns of Figures at Once but Also Strikes Balances as Fast as Items are Entered, Thus Keeping the Books Perpetually in Balance

MOTOR-CAR DIFFERENTIAL WITHOUT GEARS

A mechanical principle of novel application governs the construction of a differential recently devised for motor cars and trucks. The ordinary differential includes an arrangement of gear wheels connecting the shafts of the rear, or driving, wheels in such a way as to permit one shaft to revolve faster than the other when required, as in turning a corner. This is accomplished by the new differential without the use of gears, and at the same time it prevents idle spinning and slippage of the car wheel which has the lesser traction. The device consists essentially of four units, including a central driving plate and two grooved blocks of chrome steel, with a set of eight steel balls through which the power is transmitted. There

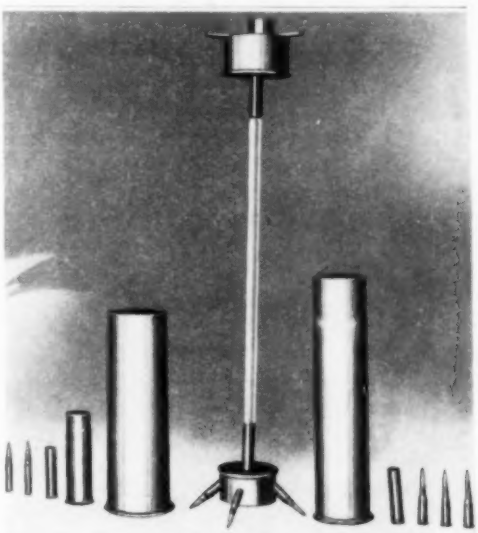


This Differential for Automobiles and Motor Trucks is Constructed without Gears and will Enable Any Car to Pull Out of a Hole with Traction on Either Wheel

are also two cast-iron friction plates, which operate only when one wheel or the other begins to spin or skid, when they immediately retard the differential action so that equal power is transmitted to both wheels, and the spinning or skidding is prevented.

SMOKING STAND MADE OF WAR SHELLS

A novel smoking stand was constructed lately at one of the munition plants in New England, from shells of various sizes such as are used in the European war. The ash receiver is a 9-in. head section of a British 18-lb. shell, two half sections of small shells being soldered on the upper rim to form cigar holders, with the head section of a British one-pounder as the match container. A 16-gauge brass shot shell, soldered in the fuse hole of the ash receiver, is tightly fitted with a glass rod connecting the upper part of the stand with the base, which consists of the head section of a French 75-mm. shell, with four 8-mm. French machine-gun shells set at the proper angle to form the feet. Another 16-gauge shot shell on top of the base receives the glass rod.



Souvenir Smoking Stand Made of War Shells: Samples of the Shells Used are Seen at the Right and Left of the Stand

DRUMMER HEATS WATER FOR TOILET WITH LIGHT BULB

The little country-town hotel that fails to provide warm water for its guests' toilet has no terrors for a certain Kansas City traveling man—providing his stopping place is lighted with electricity. In his bag with his toilet articles this drummer carries an ordinary incandescent bulb and a socket with several feet of cord attached. On retiring at night he connects his light with a socket in his room and immerses the lighted bulb in the pitcher of water provided by the landlord, covering the top carefully with a towel. When he awakes in the morning he finds the water steaming hot, even in the coldest weather.

Electric-Light Bulb and Cord Which a Kansas City Traveling Man Carries with Him to Heat Water in His Room in Hotels That do Not Provide Hot Water

¶ In the national forests of Colorado alone there were 676,000 visitors last summer. Thousands of these came in automobiles over roads built by the Forest Service under the law which provides that 10 per cent of all national forest receipts shall be spent for roads.

TWO FIRS SUPPORT HIGH PLATFORM IN FOREST

Two giant firs, standing side by side at an elevation of 4,000 ft., on Larch Mountain, 40 miles east of Portland, Ore., now serve as supports for an unusual observation station built by the Forest Service, in coöperation with Portland business men. The trees were cut off 100 ft. from the ground and a zigzag stairway constructed between the trunks to the top, where there is a railed platform and a glassed-in shelter. The tower is open to the public, and in it is sometimes stationed a lookout who watches for forest fires.

DOUBLE-WALLED EGG CUP KEEPS CONTENTS WARM

There is now being introduced in many clubs and restaurants an egg cup so constructed that it will keep boiled eggs, broken into it, warm for 15 minutes or more. It consists of two parts, a standard to which an outer bowl is attached and an inner bowl, or cup, which fits in the outer one. Before the inner cup is put into place for use, a tablespoonful of hot water is poured into the outer bowl, which has a small recess in the bottom. When the parts are fitted together, the water is forced up around the sides of the cup between the two walls and serves to keep the eggs warm for some time. The article stands 5½ in. high. The inner bowl is made of crystal glass and the standard of nickel or German silver.

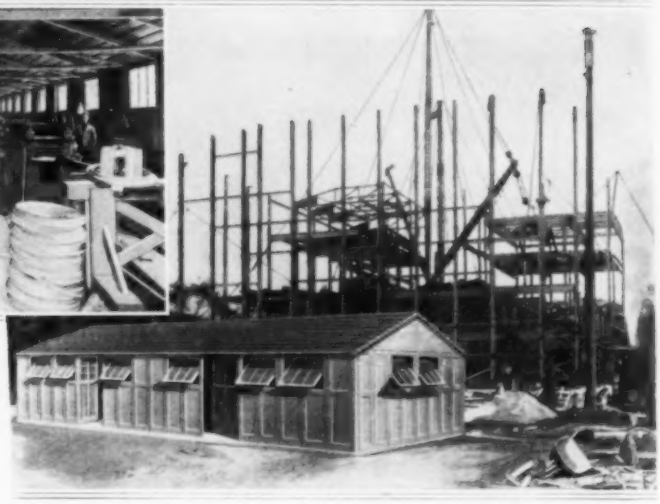
BALL HAS THRILLING TRIP AROUND THE WORLD

A round-the-world journey, which for thrilling adventure surpasses the experiences of many travelers, was completed not long ago by a bowling ball. The heavy sphere was crated and shipped to Germany shortly before the war. After fighting began, the ball was given up for lost, but in some way it was carried through the German lines to Paris, thence to London, and in time arrived in Bombay, India. While on the way from Bombay to Sydney, Australia, on the "Nubia" that ship was requisitioned by the British, or wrecked, it is not known which. At any rate, the traveling ball was finally brought by another vessel to Sydney. The rest of the journey, to San Francisco and back to New York, was without mishap. The sphere was in charge of an express company during its travels and visited various Y. M. C. A.'s. The novel undertaking was in the nature of an advertisement for balls of a certain make.

UNIT STEEL BUILDINGS FOR FACTORIES

Ready-made steel factory buildings, designed on the unit plan, are a recent product of Detroit. These buildings are made in sections, the only tool needed to put them together being a hammer, to tap in the wedges which,

Interior of Factory Building of Steel Sections Rapidly Put Together: Note the Plan of Roof Construction and Method of Lighting by Window Panels



Steel Building of Unit Factory Type Used as a Contractor's Office: This Method of Construction is Adapted for Garages and Small Buildings Like This, as Well as for Rapid Extension of Factories

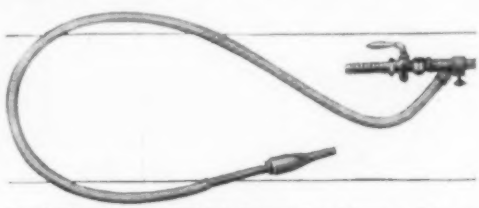
with split bolts, form the connections that lock the sections to each other to make a solid, substantial structure. In construction detail, the unit factory building is formed of various steel and steel-and-glass panels, standard in size and interchangeable. Steel roof trusses are placed on 8-ft. centers and roofed over with steel plates resembling fine roofing tile. The size of an average factory unit is 28 by 100 ft., but the sectional construction is well adapted for smaller buildings.

LARGE SALT SUPPLIES MADE USABLE

Among the states which possess vast salt resources in one form or another are Michigan, New York, Ohio, Utah, and West Virginia, the first-named claiming that it has enough salt to supply the whole world several hundred years. But most salt in its natural state is impure and some brines contain barium chloride which makes it poisonous. The Bureau of Chemistry at Washington, after careful research, has found that such salt can be deprived of its poisonous properties by adding a solution of sulphate of soda, and so large salt supplies of this character, which have had a limited use, are now made available for general commercial purposes.

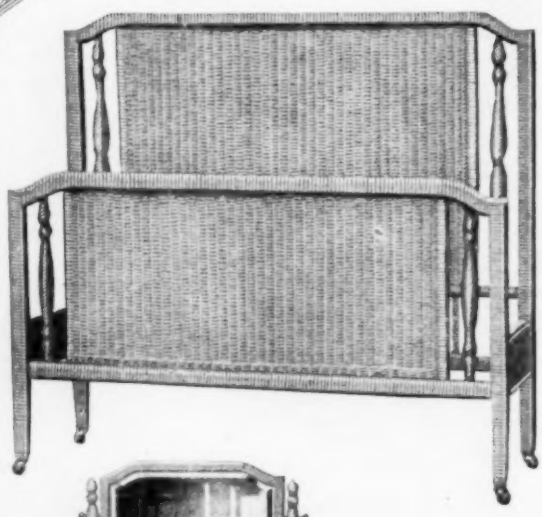
SAND-BLAST NOZZLE OF SUCTION TYPE

Special advantages claimed for a recently patented sand-blast nozzle are that it lessens the wear on the sand pipe, is easy to operate, and eliminates the necessity of using an ordinary cumbersome sand tank. The compressed-air supply pipe, which is connected with any desired source of compressed air, and the sand pipe unite at this nozzle. The free end of the sand tube is placed in a pile or pail of sand. The passages in the nozzle merge in such a way that the passing of the air swiftly across the mouth of the sand tube draws the sand up through the latter by suction and then forces it out in a violent blast. The particles are not driven through the sand tube with as much force as in ordinary machines and so less wear results.

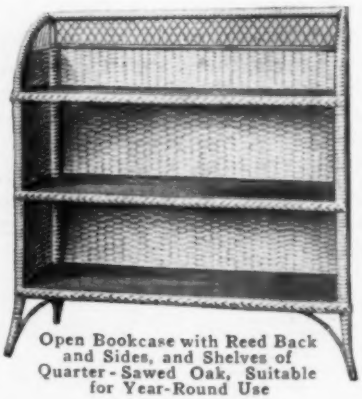


Sand-Blast Nozzle Which Draws Sand from a Pile or Pail by Means of Suction and Subjects the Sand Pipe to Less Wear Than in Ordinary Outfits

WOVEN-REED FURNITURE IN NEW DESIGNS

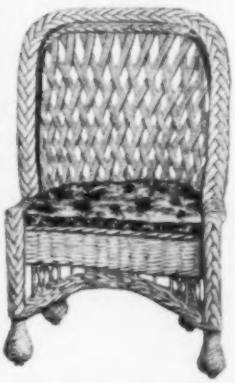


That Serviceable Furniture for the Bedroom can Now be Obtained in Reed is Shown by This Plain but Artistic Three-Piece Set Composed of a Bedstead, Chiffonier, and a Dressing Table

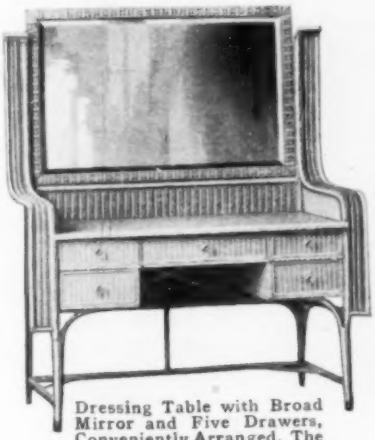


Open Bookcase with Reed Back and Sides, and Shelves of Quarter-Sawed Oak, Suitable for Year-Round Use

This Screen Is Something New in Reed Ware and Is Exceedingly Attractive. The Same Is True of the Needlework Stand, Lined with Cretonne. The Sewing Chair at the Right Matches Both These Pieces

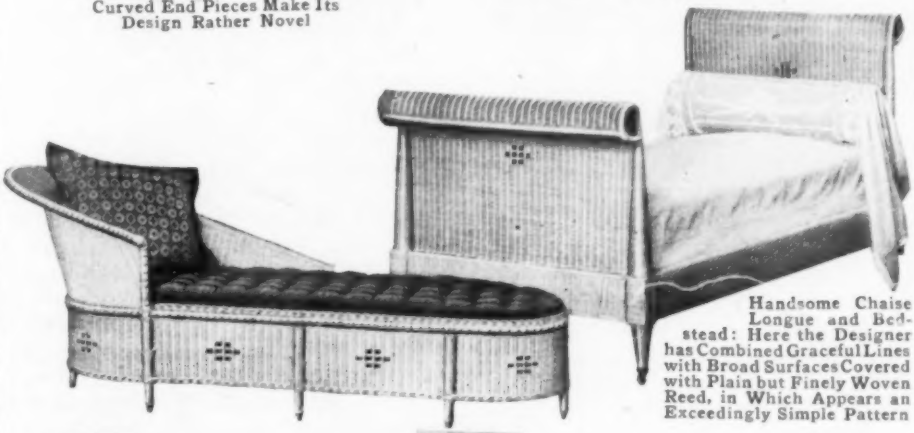


SUITED TO MANY DIFFERENT HOME NEEDS

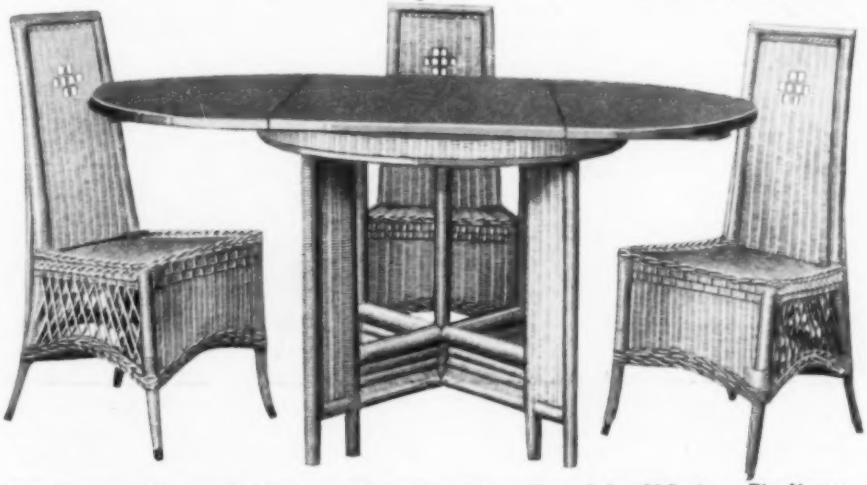


Dressing Table with Broad Mirror and Five Drawers, Conveniently Arranged. The Curved End Pieces Make Its Design Rather Novel

Buffet That Is All Reed, Except the Top and the Fronts of the Drawers, Which Are Quarter-Sawed Oak. The Open Pockets at the Sides Are Very Convenient



Handsome Chaise Longue and Bedstead: Here the Designer has Combined Graceful Lines with Broad Surfaces Covered with Plain but Finely Woven Reed, in Which Appears an Exceedingly Simple Pattern



The Round Oak Top of This Dining Table is Here Shown Extended to 56 Inches. The Narrow High-Back Chairs, Also of Reed, Lend a Distinctive Touch to the Dining-Room Set

REVOLVING PANTRY WINDOW A HANDY SERVING DEVICE

A revolving pantry window is a labor-saving convenience suitable for either a dwelling or a restaurant, with

A Revolving Window through Which Food can be Passed into the Dining Room, at the Same Time Shutting Out the Noises and Odors of the Kitchen

which food can be passed from the kitchen to the dining room without disturbing those at their meals with the noise and odors incident to preparing the food. The device is cylindrical in shape and is inserted in the wall between the two rooms to be connected. Being pivoted at the top and bottom it revolves easily. A shelf divides the window into two compartments. In one side of each compartment is a glass panel and opposite it is an opening. Preferably the openings are so arranged that when one is turned toward the kitchen the other is accessible from the dining room.

NUREMBERG PLANS TUNNEL TO DIVERT FLOOD WATERS

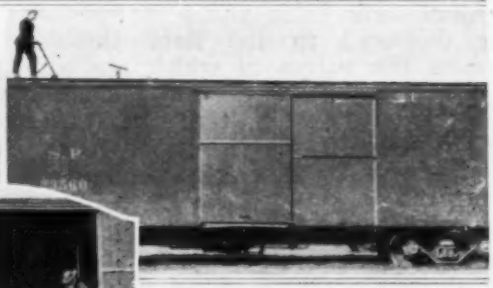
After the war the Pegnitz River, which time and time again has overflowed and wrought havoc in the picturesque old town of Nuremberg, Germany, is to be controlled by means of a tunnel nearly two miles in length, into which the flood waters will be diverted. Over $285,000 had been spent on the project when war was declared and it is anticipated that, when peace comes, work will be resumed. The total expenditure will be about $2,300,000. The control of the Pegnitz has long been the subject of study, but no satisfactory method has been found heretofore because of the peculiar conditions to be met. One plan was abandoned on account of uncertainty as to its efficiency and the disfiguring of the landscape that would necessarily result. The building of a few large reservoirs, or several small ones, was pronounced impracticable, partly because of the character of the ground, on the one hand, and the difficulty of properly controlling the barriers, on the other. The present plan includes the construction of a dam above the inlet to the proposed tunnel. The excess water will be made to run over a weir into the underground passageway. At its lower end the tunnel will empty into a canal which will parallel the river for some distance. The subterranean channel will be about 12 feet below the earth's surface and will be able to carry off 12,340 cu. ft. of water per second. This, it is believed, will be sufficient to take care of the greatest inundations. In the past 600 years Nuremberg has had no less than 138 floods, 11 of which have been great catastrophes. The government of Bavaria will assist the city in its big effort to prevent further devastation.

TRAP BOX CARS TERRIFY TRAMPS IN SOUTHWEST

In the Southwest it is no longer safe for care-free "hobos" to climb into an empty box car and lie down to rest, for the innocent-looking car may be one of the "tramp traps" which the Southern Pacific has made a part of its freight trains. Before the unsuspecting vagrants have ridden many miles in one of these especially equipped cars the doors are closed suddenly by unseen hands and locked with automatic locks. In due time they are opened by

Trap Car being Entered by Tramps, Who do Not Suspect That It Is Anything More than an Ordinary "Empty"

Photograph of an Actual Arrest of Tramps Caught in a Trap Car: It will be Noted that the Railroad Police are Well Armed



Brakeman Operating the Lever on the Roof Which Closes the Car Doors and Locks in Any Tramps Stealing a Ride

a sheriff or railroad policeman, and the imprisoned trespassers placed under arrest. On the roof of these trap cars is a lever connected by concealed cables with the sliding doors which are provided with counterweights, also concealed. When one of these cars is made a part of a train the doors are left open invitingly and the floor is covered with straw which conceals a burglar mat. The moment this mat is stepped on it lights a bulb, on the roof of the car, which is supplied with current from a small storage battery. The light burns until some member of the train crew, walking along the tops of the cars, discovers it and turns it off, and at the same time closes the doors by means of the lever. The use of these traps has spread so much terror among tramps that the number of vagrants, which formerly was very large, has been greatly reduced, and between Los Angeles and Yuma they are said to have almost entirely disappeared.

DUTCH COPY EQUIPMENT OF FIGHTING NATIONS

A militant neutrality is maintained by the Dutch army in keeping the soldiers at war from encroaching on neutral territory, and while constantly on guard the Hollanders have been quick to adopt the best inventions which they see employed by the belligerents. The gas mask and the steel helmet of the Dutch border sentinels illustrate the way in which Holland has copied the equipment of the soldiers beyond its borders.

A Dutch Border Sentinel Wearing a Gas Mask and Steel Helmet Similar to the Equipment of the Belligerents, by Whom His Little Country is Surrounded

FLOOR WASHER DOES WORK OF SEVERAL MEN

In one operation a new electrically driven floor-cleaning machine wets, sweeps, scrubs, and dries a surface while it is pushed slowly across it. The machine weighs 100 lb., is 28 in. long, and is connected to an ordinary lighting circuit by a flexible cable. An eight-

gallon tank holds soapy water that is delivered to the floor through pipes, the valves of which are constantly under the operator's control. A cylindrical brush that is revolved 600 times a minute does the work and removes the dirty water from the floor by sweeping it into a special receptacle. An automatic

This Machine Sweeps and Scrubs a Floor in a Single Operation and Does Its Work Rapidly

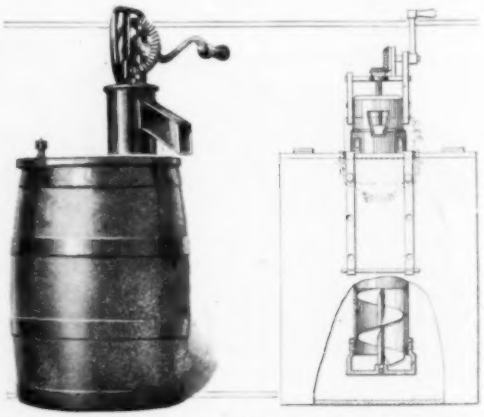
reel holds 75 ft. of conductor cable and keeps the line, which is held up out of the way, fairly taut while work is being done. When pushed at normal speed, the machine cleans about 5,000 square feet of floor space in an hour.

WHY MOUNTAINS REMAIN HIGH IN THE AIR

In answer to the question, "What holds the mountains up in the air?" the Coast and Geodetic Survey has issued a report which seems to prove conclusively that the mountains, in this country at least, are not held up above the surface of the sea by the rigidity or strength of the earth's materials but are held in place by materials underneath them that are lighter than normal. The higher the mountain or plateau, the lighter the material under it. The comparison is made with an iceberg, the visible portion of which is held above the water by the ice below, which has a specific gravity lower than water. The light material under the mountains, corresponding to the submerged part of an iceberg, extends down to a depth of about 60 miles. Likewise the bottom of the ocean is depressed, the report shows, because the material under it is heavier than normal. The normal condition may be considered as that obtaining in the large river valleys and under coastal plains.

"DRY PUMP" TAKES PLACE OF GROCERY SCOOP

A sanitary substitute for the familiar grocery scoop has been invented, with which beans, coffee, sugar, rice, etc., can be removed from their containers merely by turning a crank. The new machine is attached permanently to the top of a bin, or barrel, while its lower end, consisting of a conveying screw, inclosed in a 5-in. tube, is immersed in the food product. The crank is connected, by gearing, with this screw, and as the latter is revolved, it elevates the rice, sugar, or whatever it may be, to the top and discharges it through a spout. By using this invention barrels and bins can be kept covered at all times. The device, which might be designated as a "dry pump," also saves times and prevents waste.



Sanitary Machine Designed to Remove Food Products, Such as Beans, Rice, Sugar, and the Like, from Their Containers without the Use of a Scoop

FIREPROOF WRITING PAPER GIVEN SEVERE TESTS

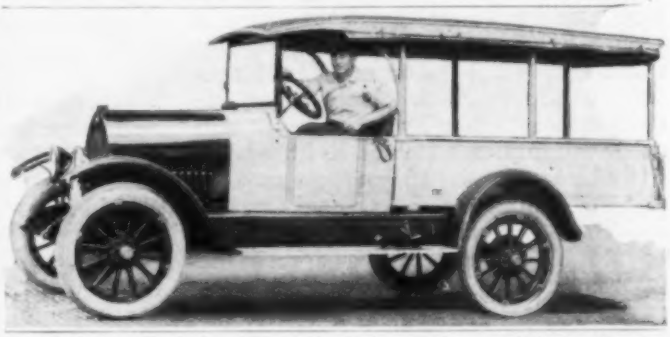
That no foreign ingredient increases the resistance of asbestos to fire is the conclusion reached as a result of scientific experiments conducted in England to determine the most suitable composition for fireproof writing paper. Another interesting point that was brought out is that in all probability no paper is actually fireproof which is made of combustible materials that hold water in molecular combination. So far as texture and tensile strength are concerned, the best results were obtained with pulps embodying precipitated hydroxides, arsenites, tungstates, and silicates. Stock in which magnesium arsenite was used proved to be the best of all that were subjected to the tests. No paper was found to be wholly satisfactory when subjected to a temperature of about 1,000° C. (1,832° F.) for 10 hours. Some papers, however, were practically uninjured after being exposed to dull red heat for one or two hours.

SMOKELESS FURNACE BURNS COAL AND BY-PRODUCTS

A smokeless furnace has been patented by an English engineer which utilizes practically all the combustible by-products in heating the boiler. The plant is so constructed that the coal is first subjected to a coking process and the gas, tar, and ammoniacal liquor are separated by distillation. The gas obtained in this way is mixed with air and is forced under pressure into the furnace, where it adds much to the heat. The gas and the coke burn without smoke and because no combustible materials are allowed to go up the chimney but are all converted into heat, the invention effects a great saving in fuel, it is claimed.

TWO INTERCHANGEABLE BODIES FOR AUTO

A West Virginia concern has an automobile which is suitable for use as a pleasure vehicle and for commercial purposes as well because that portion of the touring-car body extending back from the front seat is detachable. When this rear portion is removed, a truck body, together with a canopy that extends over the front seat, is lifted into place and fastened securely by four bolts.



Automobile with Removable Truck Body, in Place of Which a Touring Body can be Substituted with Little Labor. The Commercial Body Fits Close Up against the Back of the Front Seat

BOATS INSTEAD OF WAGONS ARE USED BY FARMERS

When trips to market are to be made, gasoline launches take the place of spring wagons for many of the farmers and dairymen in the Coos Bay region of Oregon. Much of the grazing

Even a Cow or Calf is Brought to Market Occasionally on One of These Little Launches

land, as well as that under cultivation, borders the tidewater sloughs down which the lumbermen raft timber to the mills. It is much more convenient to rely upon water transportation than to make long treks over the few country roads that are available. Therefore nearly every rancher owns a power boat and employs it whenever there is any trip to be made. Marshfield is the marketing center for the dairymen of the vicinity, so milk and other products are carried to its wharfs daily by launches. It is not an unusual sight even to see a calf or cow occupying the stern portion of the deck on one of the little craft, riding across the water with apparently no more concern than if it were going to market in a farm wagon.

IMPROVED STEPLADDER FOR FRUIT PICKERS

An improved type of stepladder, especially serviceable for fruit pickers, is

Stepladder Especially Suited for Use in an Orchard Because of the Two Supplementary Legs Which Serve as Braces at Either Side

provided with two extra legs, one of which is hinged to each side of the top. They are equipped with steel points so that they will not slip when employed as braces. The ladder is well suited for use on soft or sloping ground and even if mounted to the top step will not tip over. In cases where the side braces are not required they need not be spread out.

"THE UNITED REGIONS OF AMERICA" PLANNED

Under a plan advocated by the business men and interests represented in the Philadelphia Bourse, a new grouping of the territorial United States should be made, for economic reasons, by erasing present state lines and creating "The United Regions of America." This plan would divide the country into six great regions according to "community interests," with special regard to the importance of railroad coöperation and the character of the industries and general conditions of each. The regions proposed, with their suggested regional capitals, are as follows: Eastern Region, New York City; Southern, Atlanta, Ga.; Lake, Fort Wayne, Ind.; Central, Omaha, Neb.; Southwestern, Dallas, Tex.; and Western, Salt Lake City, Utah. It is insisted by advocates of the plan that the country has outgrown the artificial divisions of state lines, and that it should be redivided according to natural resources and economic conditions which the Interstate Commerce Commission has already recognized by designating definite zones for railroad regulation. The plan calls for the creation of an economic government for the "United Regions," under which the present Interstate Commerce Commission would be completely reorganized. It is the intention of the Philadelphia Bourse to submit the plan to congress at a convenient opportunity.

¶ The very high price of cork caused by the war has resulted in the production, in Sweden, of more or less satisfactory substitutes, one of which is made of cork waste mixed with paste. Wood is also used as a substitute in making bottle stoppers.

WOMEN AS SKILLED WORKERS IN AUTO FACTORY

Inspecting Automobile-Engine Pistons with the Aid of the Micrometer: Women are Said to Develop Great Skill in the Use of This Instrument for Detecting Defective Work

Women at Work in the Top Department of a Detroit Automobile Plant, Cutting and Sewing Materials for Auto Tops and Side Curtains: From This Department the Use of Female Help has Spread to Half a Dozen Other Departments of the Factory Requiring Skilled Labor Hitherto Furnished by Men

Above Is a Woman Operating a Machine in the Auto Factory. The Result of Setting Women at New Tasks in This Plant has Been Uniformly the Same: Increased Efficiency and Greater Output in Every Department Where They are Employed

The Girl Above is Assembling Small Parts for Auto Engines. Among the Tasks to Which Women are Now Set in This Factory Are the Assembly of Primer Systems, Switches, and All Wiring for Automobiles, besides Inspection and Drill-Press Work

Women Workers in This Factory, Who are Now Engaged, as Seen in the Above Photograph, in the Inspection and Assembly of Auto Parts, and Heavier Work of a Mechanical Nature, are Paid Men's Wages, Have Rest Rooms for Their Use, and Find the Work More Congenial than the Usual Occupations of Women

OHIO FACTORY DUPLICATES AN ALPINE BUILDING

Planned from photographs of a watch factory in the Alps of Switzerland, the building and grounds of a new watchmaking plant in Cincinnati are an exact duplicate of the picturesque original, to the last detail of construction and landscape gardening. The building is in effect a large Swiss chalet transplanted in America. Over 2,000 native Alpine plants were imported to add realism to the scene.

This Beautiful New Building Is a Cincinnati Watch Factory, and an Exact Copy of the Company's Plant in the Swiss Alps

PLAN CANAL TO CONNECT MILAN AND VENICE

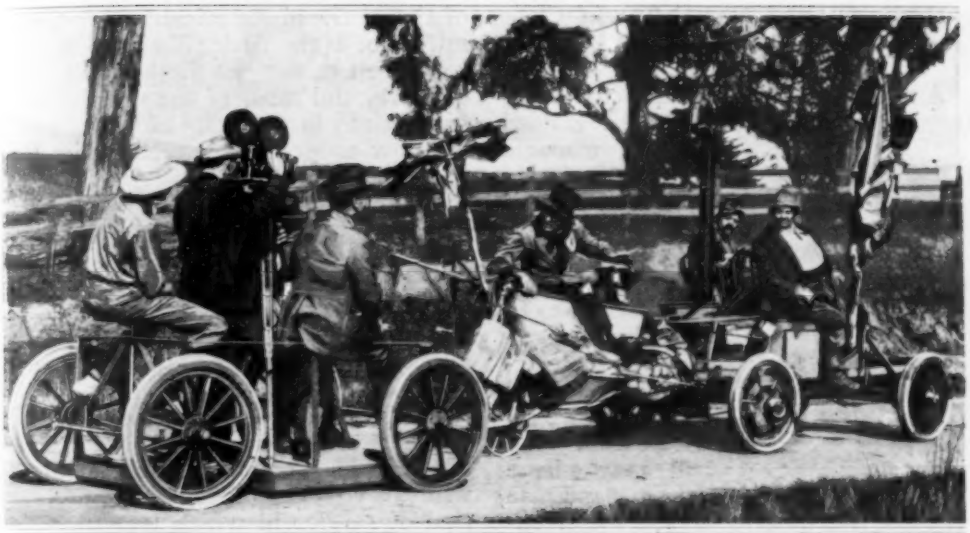
After the war the city of Milan, Italy, is to be connected with the Adriatic Sea by a system of artificial waterways, if plans which engineers have perfected and which Milan authorities have approved are carried out. It is proposed to build a canal 45 miles long, connecting the city with the Po River. The Adda River, already partly canalized, would be utilized in making this connection. The Po would be used for a distance of 160 miles and connected with the lagoon of Venice by a canal 30 miles in length. In the latter sector artificial waterways already constructed would be used. It is proposed to provide Milan with a port which would include three basins 200 ft. wide and 2,500 ft. long. The water traffic, which according to estimates would be 1,500,000 tons a year, probably would consist chiefly of coal and ores.

PRISONERS DRESS FLEAS TO SELL AS SOUVENIRS

From the pest-ridden prisons of Mexico comes one of the strangest types of mementos that men in involuntary confinement have ever produced—dressed fleas. By methods not wholly known to outsiders the inmates of Mexico's penitentiaries dry, dress, and mount fleas which they catch in their cells. The bottom of a bottle is sometimes used as a magnifying glass and tiny pincers are also employed in this work. The pair shown herewith represent a bride and groom. The former is about an eighth of an inch high and is dressed in fine white material with a flowing train. The groom wears the usual black. The illustration shows the fleas magnified many times.

PORTABLE PLATFORM FROM WHICH MOVIES ARE TAKEN

The thrilling chase which every "movie" enthusiast has witnessed on the screen so often, and frequently at close range, is photographed by mounting the motion-picture camera on some sort of vehicle that is driven or drawn behind those that are pursued. One of



Efficient Type of Camera Truck Attached to the Rear of a Vehicle Used in a Comic "Movie" Scene, Showing How Continuous Close-Up Views are Obtained of a Moving Conveyance

the most practical of these camera trucks, as they are often called, has been built in Santa Barbara, Calif., and consists of two pairs of automobile wheels from the axles of which is hung a platform measuring 4 by 6 ft. The rubber-tired wheels minimize the jar to which the camera is subjected. The platform is large enough to hold the camera and tripod and three men. The outfit is often tied to the rear of the vehicle being photographed, as shown in the accompanying illustration. This truck can be used to advantage in a studio also.

TUNING DEVICE DECIDES ORCHESTRAL PITCH

A musical director of Los Angeles, Calif., has invented what he calls a tonameter, which does for the instruments in an orchestra the same thing that a tuning fork does for the voice—that is, it establishes the pitch, and tells whether the instrument is in tune or not. In form, however, it differs widely from the ordinary tuning fork, being a large wooden box in which are fixed six bars of metal so perfectly tuned and adjusted that there is a difference of only one vibration a second between any two bars, the first having 435 vibrations—international pitch; and the last 440—orchestral pitch. A pendulum attached to the box and, making a complete swing in exactly one second, assures the correct measurement of the variations in tone which follow the striking of one of the bars. The inventor claims that the instrument makes it easy for a leader to detect any tendency to play the least bit out of tune.

Testing the Pitch of Instruments in an Orchestra with a New Tuning Device: By Striking the Metal Bars Differences from Standard Pitch are Detected

HANDCUFFS USED TO LOCK MOTORCYCLES

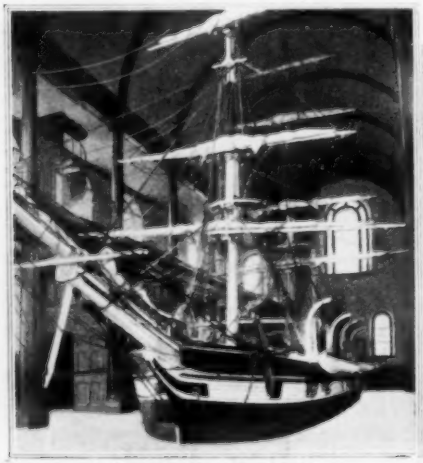
An instance in which handcuffs have been employed to prevent theft, instead of to manacle criminals, is to be found in Los Angeles where members of the police force use these shackles to lock their motorcycles. This arrangement has effectively checked the thieves who have stolen several police machines and also relieved the officers of the inconvenience of carrying special locks.

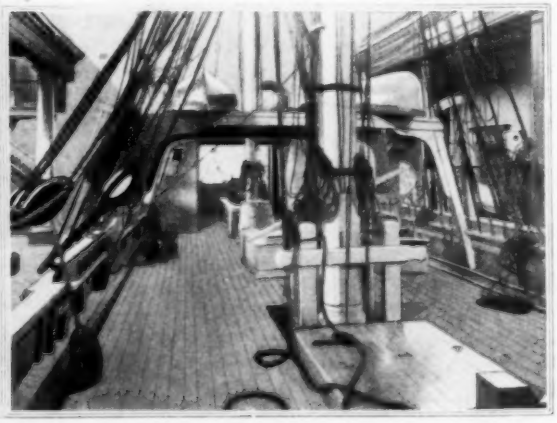
MAKING AMERICANS OUT OF FOREIGN-BORN WOMEN

Strong efforts to Americanize the foreign-born women of Detroit's new population are being made by clubwomen of that city, with the support of the Detroit Board of Commerce, which has had a committee at work for some time on the Americanization of foreign-born men. When the women's campaign was started, a representative of the National Americanization Committee of New York City was invited to Detroit to suggest the best methods of work, and most of the women's organizations in the "City of the Straits" are now coöperating effectively in the patriotic movement to Americanize their foreign sisters.

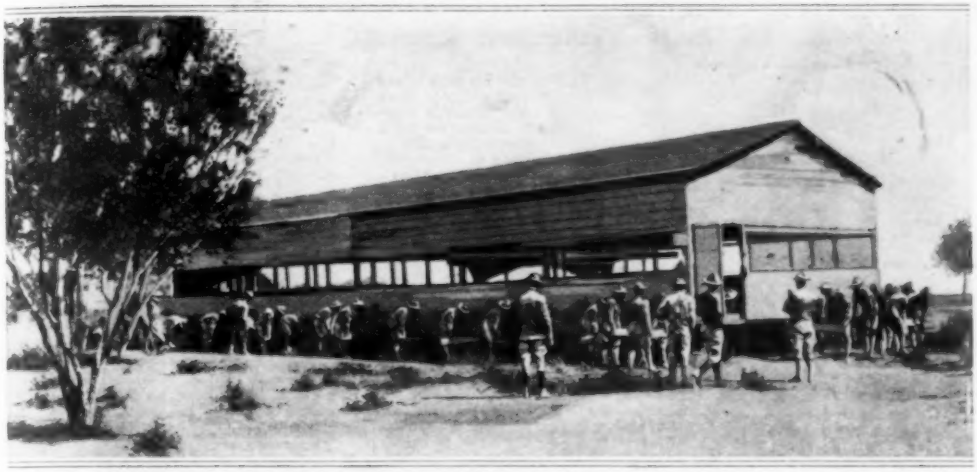
BIG MODEL OF OLD WHALER IS BUILT FOR MUSEUM

At New Bedford, Mass., once the seat of the industry, a museum devoted exclusively to whaling relics has lately been established. Among other things it contains a half-size replica of the "Lagoda," an old whaler accredited with 12 voyages during a 44-year period of service in which it netted the owners about $650,000. The model, which is fully rigged and equipped, was constructed at a cost of $25,000 and occupies most of the floor space in the new museum, a building designed after the old Salem customhouse where Hawthorne was once employed. The lofty spars of the "Lagoda" extend to within a few feet of the high, arched ceiling, stalwartly commemorating the once romantic and flourishing industry of the east coast. The building is 118 ft. in length and 57 ft. wide, while the model ship measures 89 ft. from flying jib to spanker boom.





Left: Fully Rigged and Equipped, This Interesting Big Model of a Once Famous Whaling Vessel is Sheltered in a Museum at New Bedford, Massachusetts. Right: Deck View of the Ship That Commemorates a Once Flourishing and Romantic Industry of New England



Two Hundred and Fifty North Dakota Troopers at Mercedes, Texas, Carrying the Christian Association Building, Weighing Six Tons, to a New Site

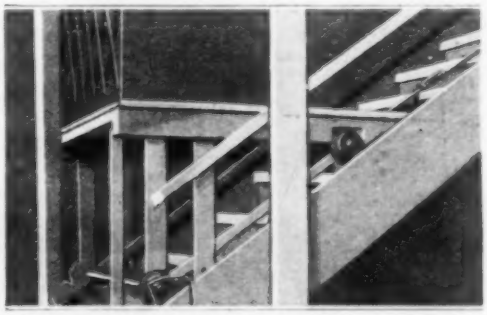
BORDER TROOPS CARRY SIX-TON BUILDING

Carrying a six-ton building without the aid of machinery, or other equipment, was one of the unusual tasks performed by 250 North Dakota soldiers when they were on the Mexican border. The frame structure that was moved housed the army Y. M. C. A. at Mercedes, Tex., and measured 72 by 24 ft. Because the site was undesirable, it was proposed to hire a contractor to move the structure to a new location, but the army engineers devised a plan by which the men themselves could perform the task and so save money. They estimated that with 250 soldiers helping, each would have to carry less than 50 lb. Accordingly the building was well braced and its walls provided with runners. Since there was no floor the men were stationed along all four walls, inside as well as out, each soldier standing next to a beam inserted beneath. At the word of command they lifted the building from the ground and marched away with it, to a site 200 yd. distant.

¶ Fishermen on the Pacific coast, from San Francisco to San Diego, have brought in so few fish in recent months that the situation is becoming serious. The cause of the shortage is not known.

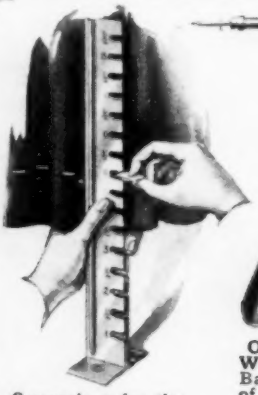
ELEVATOR THAT CLIMBS A STAIRWAY

An elevator for carrying loads up an ordinary stairway is in use at a New Jersey factory. Its platform is normally level with the floor at the bottom of the stairs, which can then be used in the ordinary way. When a load is placed on the platform, and an electric button is pressed, a ¼-hp. motor raises the elevator, which runs on four small wheels on tracks resting on the risers of the stairway. The shaft driven by the motor is at the top of the stairs and connected to the elevator platform by small chains on either side. When the load is removed at the top, the elevator returns automatically to the lower level.



Stair-Climbing Elevator, Just After It has Left the Lower Floor Level, Where It Normally Rests Out of the Way

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



Convenient for the Woman Who Does Her Own Sewing: A Simple Skirt Marker That Lessens the Work of Turning a Hem. Price, 25 Cents

For the Lawn, a Weed Exterminator: The Hollow Handle Contains Kerosene or a Saline Solution Which is Injected into the Roots of Dandelions or Burdock Plants. Price, $1

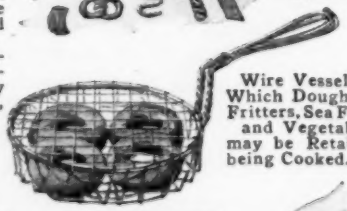
Open-End Pans in Which Bread may be Baked in a Variety of Shapes. Available for 25 and 40 Cents

Fuel-Saving, Glass-Door Oven for Gas Stove: It Is Especially Serviceable for Small Bakings in the Summer Time When the Use of an Ordinary Oven Overheats a Kitchen. Price, $6.20

This Aluminum Pot Prepares Coffee in One Minute. Grounds and Boiling Water are Placed in Upper Section, Which is Separated from Bottom by Muslin Strip. Price, Six-Cup Size, $5

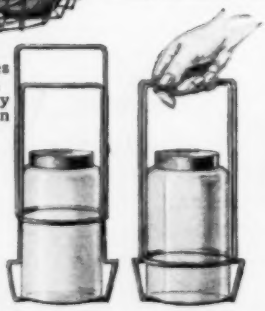
Dough Gun, with Assortment of Dies, That Enables a Housewife to Make Cookies in Attractive and Original Shapes. Price, $1.25

Combination Magazine Rack and Smoker's Stand, Finished in Cream Color and Ornamented with Bright-Hued Parrot. Price, $12



Wire Vessel in Which Doughnuts, Fritters, Sea Foods, and Vegetables may be Retained While being Cooked. Price, 50c.

Folding Ironing Board That Occupies Little Space When Not in Use: It may Easily be Carried in a Trunk. The Price Is $3



Fruit Jars can be Removed from Boiling Water, in Which Their Content has been Cooked, by Means of the Device Illustrated Above. Pictures Explain Its Operation

When Orange Rinds are to be Used as Sherbet Cups, the Tool Shown Above Is Valuable. Price, 25 Cents

Motor-Driven Washing Machine with Adjustable Legs: The Swinging Wringer Operates in Any Position. Extra Pulley Permits Motor to Run Household Appliances. Price, $60

For Those Whose Tastes Run to Unusual Designs, There Is This Odd Oriental Teapot Made of a Very Thin Japanese Earthenware. The Price, Prepaid, Is 75 Cents

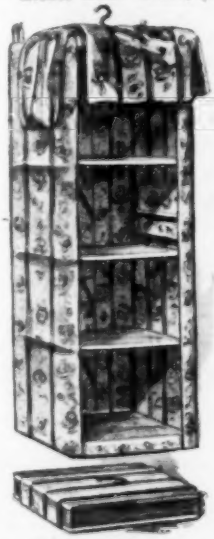
This Ornamental Plaque Has a Concealed Chamber That Holds a Deodorizer for Sick Room

Picture Hooks That Eliminate Use of Wire, Do Little Injury to Wall, and Prevent Picture from Getting Out of Line. Box of 20, Ten Cents

Folding Pigskin Bag with Attractive Linen Lining and Strong Locks. Twenty-Inch Size, $28

The Blades of This Silver Knife are Opened by Turning the Rings Provided at Either End. Price, $1.35

For Picnickers, Motorists, and Others, Sanitary Lunch Forks Like This One are Provided in Sealed Individual Envelopes

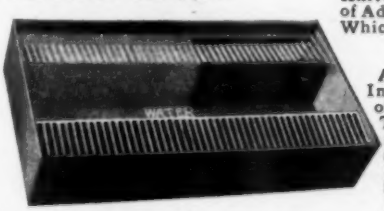


For the Woman Traveler, a Collapsible, Hanging Depository for Hats and Delicate Apparel Requiring Protection from Dust: It is Made of Cretonne and Folds to Size Shown. Price, $8.75

Light-Weight, Practical Electric Fan with Six-Inch Blades. It is Particularly Suited for the Small Office. The Price Is $5.95

Double Curtain Rod Especially Desirable for Bay Windows: Knuckle Joints Permit Proper Adjustment without Bending Rod or Brackets. Price, $1.60

A Convenient Household Device That Lessens Work of Cleaning and Polishing Knives and Forks: Consists of Adjustable Spring over Which Chamois is Laid. Price 40 Cents

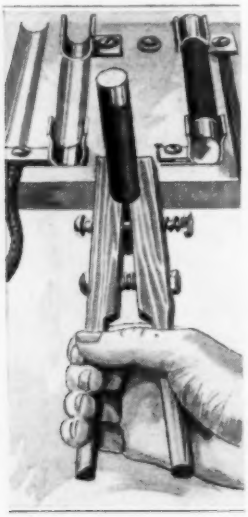


At Left is Shown Interior Construction of a New Humidifier That, on a Hot Radiator, will Evaporate a Gallon of Water in 12 Hours. The Perforated Wings Hold Wicks; the Central Part, Water. Price $3

Jewelry-Drying Can Supplied with Hardwood Sawdust: After Proper Cleaning, Stones are Given Brilliant Luster

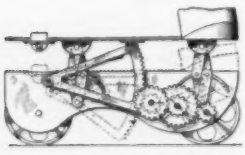
WOODEN FUSE PULLER FOR HOUSEHOLD USE

A serviceable article for use in an electrically lighted home is a fuse puller designed by a Brooklyn inventor. It consists of two wooden arms about eight inches long, each of which is fashioned at one end into a handle, while the opposite ends are suitably notched. The arms are held side by side by two long bolts. Around the bolt nearest the handles, and between the two members, is a coil spring that serves to spread the arms apart, while on the other bolt are two coil springs, outside of the arms, which tend to press the ends of the arms together. By merely pressing the handles together while holding the tool in one hand, the notched ends may be opened to grasp a fuse, without in any way exposing the user to an electric shock.



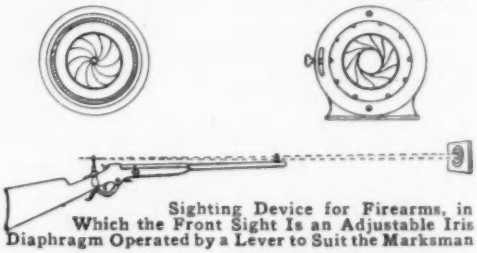
ROLLER SKATES GEARED TO INCREASE WEARER'S SPEED

Roller skates equipped with gearing intended to increase the wearer's speed automatically, are among recently patented inventions. Power is transmitted to the rear roller of this skate by means of a set of gears, a ratchet, etc., concealed beneath the footplate. When the foot is raised off the floor that part of the skate below the footplate drops down an inch or more. Then, when the weight is thrown on the footplate again, it presses it down to its normal position, at the same time causing the rear roller to revolve by means of a suitably connected ratchet. With each new stroke the ratchet is drawn up and then pressed down, as described, thus giving driving force to the rear roller.



RIFLE-SIGHTING DEVICE FOR TARGET PRACTICE

A sighting device for use in rifle-target practice, recently patented, includes an adjustable iris diaphragm which operates in a manner resembling the accommodation of the human eye, by which the pupil is expanded or contracted automatically. In this gun sight a similar adjustment is obtained by manual operation of a lever attached to the diaphragm at the front of the rifle. This enables the marksman to adjust the opening so as to shut out all undesirable rays of light while allowing the eye to view the bull's-eye and a small clear space around it. A peep sight is arranged at the rear of the rifle and with the iris-diaphragm adjustment the shooter can choose the most suitable aperture for the front sight, according to his individual requirements.



Sighting Device for Firearms, in Which the Front Sight Is an Adjustable Iris Diaphragm Operated by a Lever to Suit the Marksman

SINGLE-TRACK DUAL-GAUGE RAILWAY BRIDGE

So as to accommodate the rolling stock of both Russian and Swedish railways, which are of different gauge, two sets of rails are to be laid on a single-track bridge that will span the Torneå River between Torneå and Haparanda, at the upper end of the Gulf of Bothnia. This structure will be a part of the connecting line which

is to link the Finnish and Swedish transportation systems. The engineering plans for the project have been completed and it is expected that the work will be finished some time in the fall of next year.

FOLDING CHAIR EQUIPPED WITH AWNING

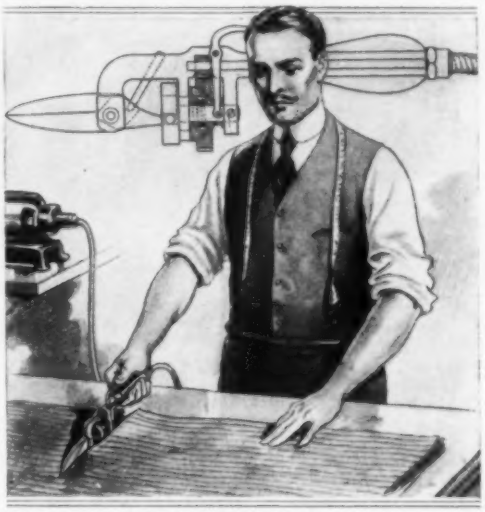
A beach or garden chair has been patented which is especially convenient for outdoor use because it can be folded into small space and is equipped with an adjustable shade to shield the occupant from the sun. The frame of the chair is of wood and is built like an easel, the front half serving both as a support and as the back of the chair. Hinged to it at the proper height is a seat which can be raised to a horizontal position and held in place by braces. The back of the chair is made high enough to extend above the head of the occupant. Fastened to the upper end of the back, by brackets, is a canvas curtain mounted on a spring roller. Attached on either side of the brackets is a U-shaped wire frame which can be held out in a horizontal position by

Beach or Garden Chair Which can be Folded into Small Space and is Equipped with an Adjustable Canvas Awning

adjustable supports. The canvas can be stretched out over this frame and so made to serve as an awning.

MOTOR-DRIVEN SHEARS NEW TOOL FOR TAILORS

For the benefit of cutters in the tailoring industry and also of those engaged in similar branches of associated



Electrically Operated Shears Intended for Cutters in Garment Making and Similar Industries

occupations, power-driven shears have been developed by a Chicago inventor. Although materially increasing a tradesman's capacity, a more important advantage of the instrument lies in the fact that it obviates manual work of a character which frequently disables the person constantly employed at it. Driven by a small motor installed above a workbench, a flexible shaft connects with a rigid one extending through the handle of the tool and supplies the power that operates the upper blade. The lower cutting member remains stationary. One hundred cuts a minute is the normal working speed of the tool. A thumb lever stops and starts the shears, but otherwise the instrument is controlled in the feeding. The weight is about the same as that of ordinary tailor shears.

¶A Pittsburgh scientist has invented a bayonet that carries near its end a capsule containing antiseptics, etc., designed to render painless and cleanse the wound inflicted.

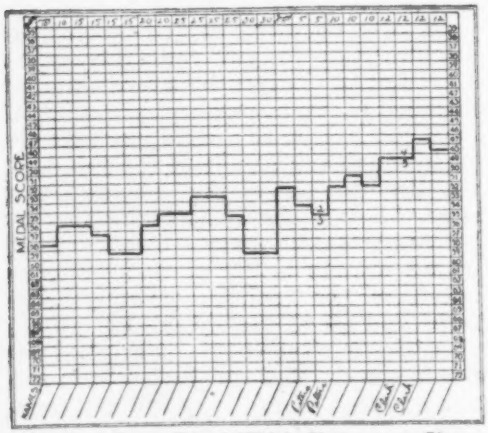
RIGHT AND WRONG WAYS TO LIFT HEAVY WEIGHTS

A well-known metallurgical company has recently issued instructions showing the right and the wrong ways to lift heavy objects, such as ingots or castings. The way which is condemned, and which many workmen thoughtlessly follow, consists in grasping the load with both hands while stooping over and scarcely bending the legs at all. Lifting in this posture throws most of the weight on the lower part of the back, where the muscles are weakest, and may produce a severe strain, or rupture. The proper way is to grasp the load after squatting down close to it so that the knees are drawn well up against the body. Lifting in this manner throws the weight on the thighs and shoulders, which are strong and best suited to the severe stress that comes in raising the body to an erect posture.

Left: A Lifting Posture Which Subjects the Small of the Back to Undue Strain and may Result in a Rupture. Right: With This Position the Strain is Thrown on the Thighs and Shoulders

GOLF-SCORE CHART SHOWS SEASON'S RECORD

A graphic portrayal of a golfer's scores for an entire season, or any desired period, together with the scores of his opponents, can be prepared by using a golf-score chart which has been patented by a frequenter of a Kansas City course. The chart consists of a piece of cardboard ruled off with uniformly spaced vertical and horizontal lines. In the tops of the columns are written the dates of the games. At the right and left-hand sides are figures set down in numerical order from 35 to 72, for example, to represent the range of possible scores. The medal score for each nine holes played by the owner is recorded merely by drawing horizontal lines, under the proper dates and through the squares opposite the respective scores. When match games are played, the opponent's name is written at the bottom of the column, the score of the chart's owner is written above the line in the square, and his opponent's is entered below the line.



A Golfer's Score Board Which Shows at a Glance One's Scores for an Entire Season, Together with Those of One's Opponents

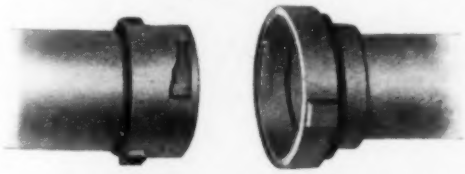
METHOD OF FIGHTING FROST IN WATER TANKS

Dairy farmers and stockmen in the vicinity of Goshen, Ind., have found an inexpensive way of using electricity to prevent their water tanks from freezing in cold weather, without re-

sorting to the aid of electric heaters. Where the pumps are equipped with electric motors, they operate the motor so as to pump just fast enough to raise the warmer water of the well to the tank in sufficient quantities to keep the water temperature in the tank just above freezing. It is necessary to let enough cold water run off from the bottom of the tank to make room for the water added, but the value of this wasted water is regarded lightly in view of the saving effected by keeping the tank in service when the weather is severe.

SPECIAL JOINT EMPLOYED ON GALVANIZED PIPE

It requires only a few seconds to make a water-tight connection between two lengths of galvanized steel pipe

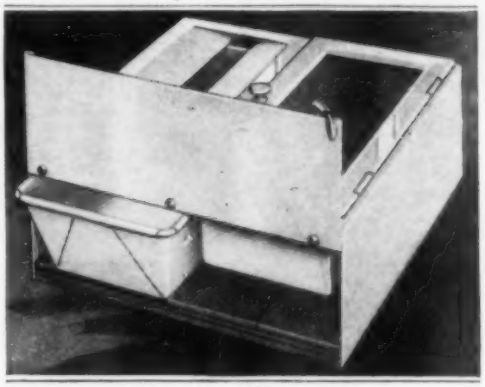


This Joint Facilitates the Laying of Pipe, for It Enables a Water-Tight Connection to be Made Quickly

fitted with a patented joint lately introduced in Australia. Locking members, whose inner edges are corrugated, are supplied on the inside at one end of a section of pipe and on the outside of the other end. Thus by inserting the small end of one length into the large end of the other and twisting them, the locking members are engaged. A rubber washer makes the joint water-tight. Lugs on the circumference of both sections enable a wrench to grip firmly.

SANITARY HOLDER FOR KNIVES AND FORKS

A sanitary holder for knives, forks, or spoons has been designed for use in eating places in which the patrons wait on themselves and, when the meal is over, return their dishes and utensils to a counter. The device consists of a white-enamel case, having a wooden bottom and an open back, in which two deep trays are placed side by side. One half of the top is covered by a hinged glass door which affords access to the

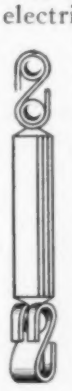


A Sanitary Holder for Knives, Forks, and Spoons, in Which Are Two Trays, One for Clean Utensils and the Other for Used Utensils. This Rear View Shows How the Tray for the Latter may be Removed

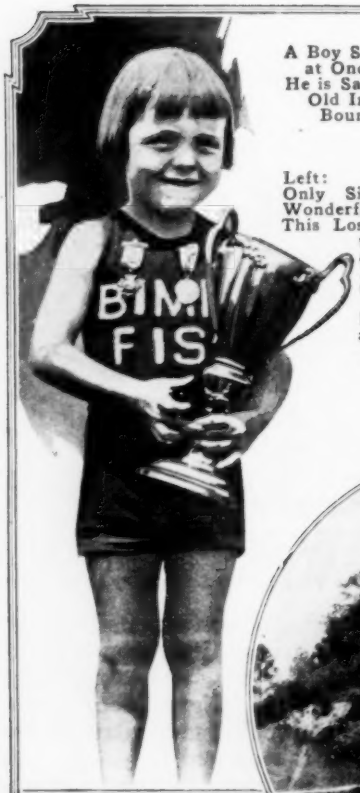
tray containing clean utensils only. The other half is entirely covered except for a narrow slot extending lengthwise in a slight depression. Through this opening used utensils are deposited in the second tray. A sign explains the purposes of the compartments. The trays can be easily removed and others put in their places as occasion demands.

INSULATOR AND LINKS FOR ELECTRIC-LIGHT CHAINS

A new type of a splicing link for electric-light chains consists of an S-shaped hook slotted at each end, so that two chains can be united by fitting their ends into these slots. By using two links and inserting between them a special insulating unit, having suitable knobs at the ends to which the hooks can be attached, a light chain can be thoroughly insulated from the electric current—an arrangement most desirable in a bathroom where short-circuiting may prove fatal to a bather, particularly if he operates a switch while in the water.

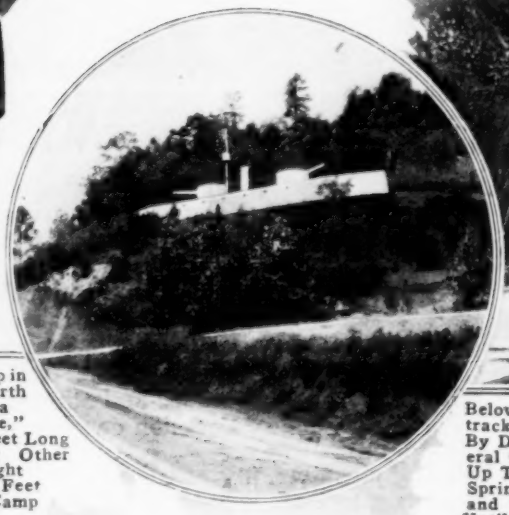


YOUNG FOLKS AT WORK AND PLAY,



Left:
Only Six Years Old and a Wonderful Swimmer and Diver! This Los Angeles Boy Learned to Swim at Three, and at Four Was More at Home in the Water than the Average Grown-Up. He has Won Many Honors, as His Medals and Loving Cup Show, and Is a Licensed Swimming Instructor!

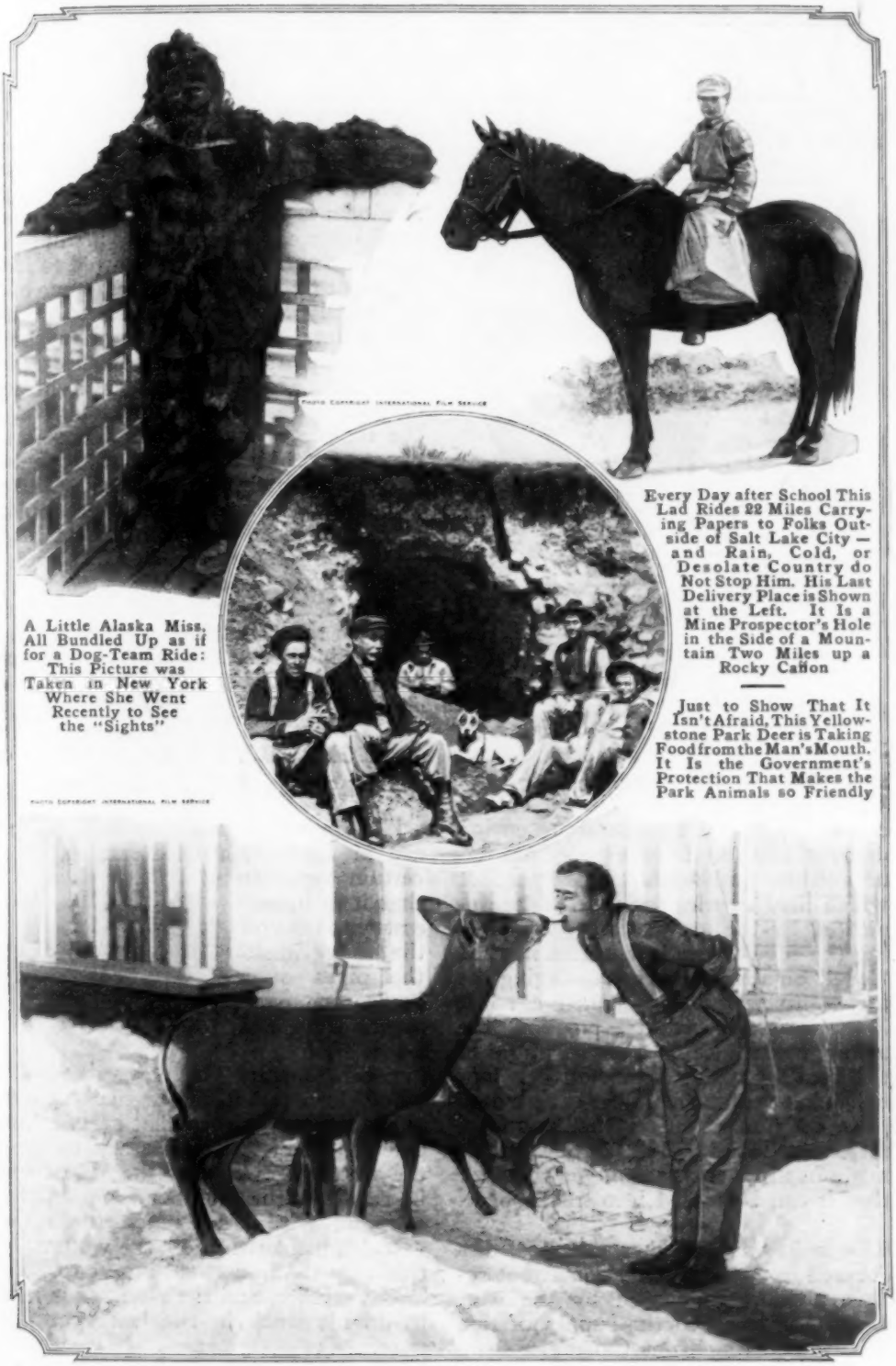
A Boy Scout Who Is in Two States at Once—Kansas and Nebraska. He is Saluting from the Top of an Old Iron Post That Marks the Boundary between the Two



Center: A Summer Camp in the Mountains of North Carolina, Built Like a Battleship: The "Maine," as It is Called, Is 92 Feet Long and Contains, among Other Accommodations, Eight "Cabins," Each Seven Feet Square. Boy Scouts Camp Here in Summer

Below: A Boy-Made Race-track for Young Bicyclists. By Dint of Hard Work Several California Lads Threw Up These Adobe Banks and Sprinkled Them with Water and Then with Crude Oil Until They Had a Hard Track

AND SCENES THAT INTEREST THEM



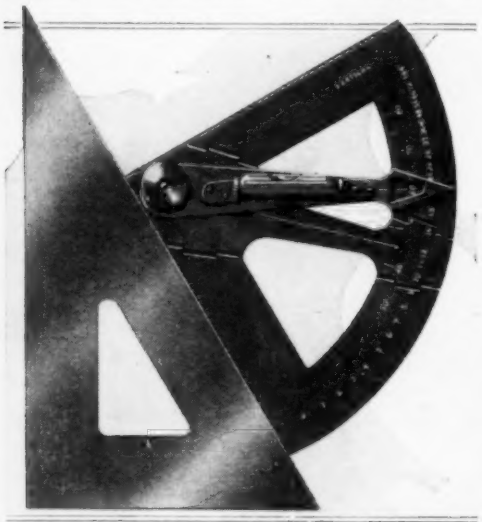
Every Day after School This Lad Rides 22 Miles Carrying Papers to Folks Outside of Salt Lake City — and Rain, Cold, or Desolate Country do Not Stop Him. His Last Delivery Place is Shown at the Left. It Is a Mine Prospector's Hole in the Side of a Mountain Two Miles up a Rocky Canon

A Little Alaska Miss, All Bundled Up as if for a Dog-Team Ride: This Picture was Taken in New York Where She Went Recently to See the "Sights"

Just to Show That It Isn't Afraid, This Yellowstone Park Deer is Taking Food from the Man's Mouth. It Is the Government's Protection That Makes the Park Animals so Friendly

DEVICE MEASURES PITCH OF ANY INCLINE

An instrument has been patented which simplifies such problems as that arising in calculating the length of



A Device with Which One can Quickly Ascertain the Angle of Any Incline and Its Rate of Fall per Foot

rafters required for a roof of a certain pitch. It consists of a flat quadrant-shaped framework to which is pivoted an arrow at the right-angle corner. The inner edge of the curved side is marked by graduations representing degrees, and on the outer edge are figures to show, in inches, the fall per foot which marks the various angles indicated by the graduations. By placing the edge of the instrument marked "level" on a roof and then swinging the arrow, to which is fastened a spirit level, into a horizontal position, the arrow will indicate both the angle of the roof's pitch and the fall per foot which the roof makes. With these data it is easy to calculate the length of rafters required. The framework is made in three parts so hinged together that it can be folded into small space.

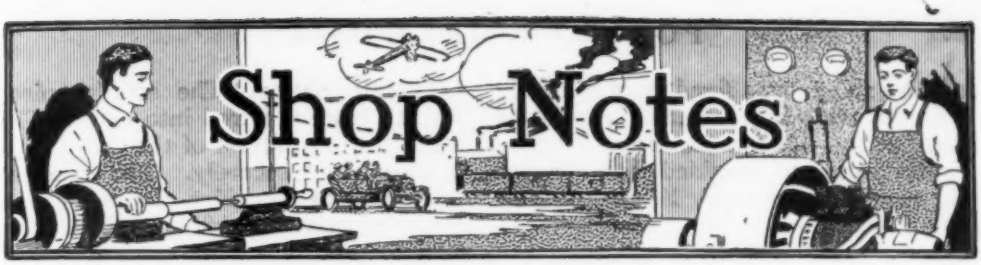
¶ Deposits of long-fiber asbestos, discovered in Arizona, may somewhat relieve a shortage caused by the war, which has lessened the supply of this material coming from Canada.

ELECTRIC-SHOCK VICTIMS REVIVED IN ODD WAY

Quite a peculiar but apparently effective method of reviving persons who have received serious electric shocks is practiced by the employes of a New York light and power company. A victim is seized by the ankles, lifted until the weight of his body is imposed upon his neck, and then allowed to fall. Without removing the shoes, some one vigorously hammers the soles of the man's feet, just as a policeman commonly does to rouse men from drunken slumber. Usually when a heavy current passes through a person's body, the tongue is swallowed. Thus it is expedient that the mouth be opened and the tongue pulled forward. These three things constitute this particular plan of first-aid treatment. Not long ago a line foreman received 2,300 volts and fell from a pole. Although to all appearances he was dead, his fellow workers resuscitated him by following the outlined rules, and the man recovered completely.

STOP VALVE WHICH AIDS IN REPAIRING FAUCETS

A stop valve has been devised for use in connection with faucets of a certain type, so that it is unnecessary to turn off the water in all the pipes of a home, or apartment, when a single faucet is in need of repair. This new valve is situated close behind the regular tap and is covered with a cap that screws into place. When it is necessary to keep the water back so that the faucet can be repaired, the plumber removes this cap and with his wrench turns the valve, thus shutting off the water. In this way the household is put to little inconvenience, and the plumber is able to do his work in the least possible time.



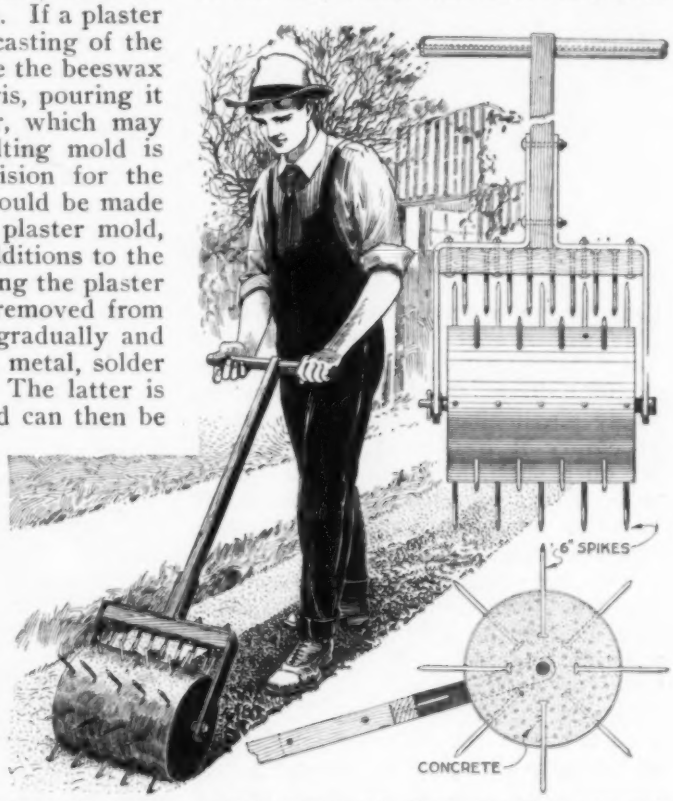
Wax Patterns for Making Plaster Molds

In experimental work, as well as in the making of patterns for ornamental or shaped pieces, the use of wax patterns is economical and practical. Pour the melted beeswax into a rough mold, or box, approximately the size of the pattern. Cool it, and carve it to the desired form, using a knife, or other sharp tool, slightly warm. If a plaster mold is desired for the casting of the pattern in metal, immerse the beeswax pattern in plaster of Paris, pouring it into a suitable container, which may be used when the resulting mold is poured in metal. Provision for the entrance of the metal should be made by cutting gates in the plaster mold, or by making suitable additions to the wax pattern before pouring the plaster around it. The wax is removed from the mold by heating it gradually and then pouring the molten metal, solder or lead, into the mold. The latter is sawed open carefully and can then be used again. The soft metal may be shaped further to form a pattern for molding in sand, if desired.

Spiked-Roller Garden Harrow

Proper cultivation of perennials in the home garden, beds of which cannot be spaded handily without injury to the plants, was provided by the use of a homemade roller harrow. In the spring, when the asparagus, for example, comes up, the bed is harrowed thoroughly, stirring up the soil, and pulverizing it, without cutting the roots. The piercing of the plants by the spikes does no serious harm. The frame supporting the harrow may be fitted to a plain roller when desired.

The roller harrow was made as follows: A large can was fitted with 6-in. spikes, spaced as shown in the detail sketch. A pipe was set in the center of the can, which was then filled with concrete. A rakelike cleaning bar, made of 2 by 2-in. stock, and fitted with spikes, spaced to mesh with those

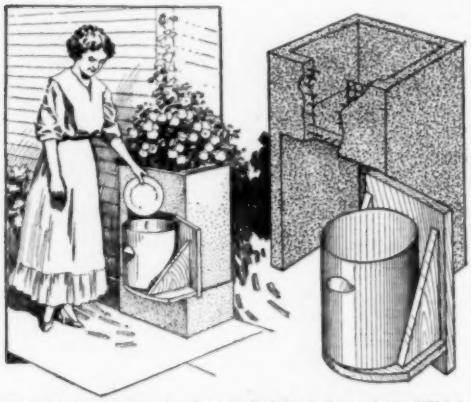


The Roller is Run over Beds of Perennials, Cultivating Them with Only Slight Injury to the Roots, Which does Not Hinder Growth

on the roller, was fixed to the handle and the strap-iron braces. The latter were set on a long bolt, inserted in the center pipe, and provided with a cotter for easy removal.—E. B. Smith, Chicago, Ill.

Garbage-Can Housing of Reinforced Concrete

The unsightliness, and most of the common insanitary features, of the home garbage can were overcome by



The Garbage Can is Concealed in a Container Which Serves Also as a Flower Box

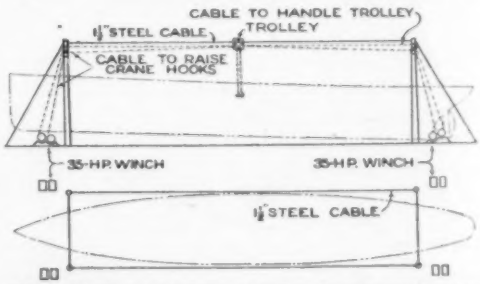
providing a concrete receptacle for it. The upper part was arranged as a flower box. A large lard can was used as the garbage container, its comparatively small size making it necessary to empty it frequently. The can is set on a shelf, bracketed to the door, which is hinged on a wooden strip, set into the concrete. A metal latch holds the door shut.

The size of the housing is suited to the can. That shown is 36 in. high. The hollow base is cast separately, without reinforcement. The form for the base consists of one box within another, the intervening space being filled with concrete, the concrete for the top of the base being placed over the top of the inner box, and leveled off on the upper edges of the outer form.

The main section of the housing is built up around a wire-mesh frame. The mesh is cut to form reinforcement for the three longer vertical sides, and bent into shape. The smaller piece for the front is wired into place. The mesh for the bottom of the flower box is also wired securely. The concrete is applied to the sides of the mesh, a roughing coat being first applied. The surface of this is left rough to afford a good hold for the finishing coat. For the roughing coat a mixture of 1 part Portland cement and 2 parts of clean, fairly fine sand is used; and for the finishing coat, 1 part cement and 1 part fine sand. The surfaces are troweled smooth.—M. Veldman, Grand Rapids, Mich.

Cableway for Handling Shipbuilding Material

Rigging for the handling of material for the building of ships that offers suggestion for application to other types of large construction was devised for a plant in Seattle, as indicated in the diagram. At each end of the slip, in which the craft lies, are two posts, 110 ft. high, well guyed and anchored. A steel cable, 1½ in. in diameter, extends between the posts and carries a trolley operated by power winches, of the double-drum type. One drum on each winch raises



The Cable Suspended from the 110-Foot Posts Carries a Trolley for Handling Material

and lowers the crane hook on the trolley and the other pulls the trolley back and forth.—B. W. Brintnall, Seattle, Washington.

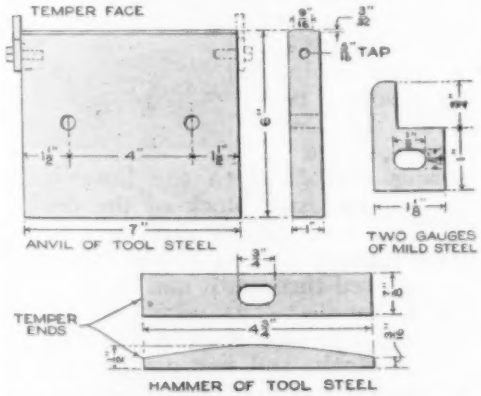
¶A coat of raw linseed oil brightens and preserves old outside paint. Do not permit it to gather in drops on the lower edges of clapboards and similar edges.

Two Shovels Used as Post-Hole Auger

When only a few holes for posts are to be made, and no auger is at hand, a good substitute may be devised by using two spades, or shovels. A strong rope is tied around the handles of the shovels to form a loop, about 8 in. long when extended. Grasp the shovels by the handles, extend them within the rope, and drive them into the ground. The earth is cut loose, and then removed from the hole by spreading the handles, and drawing it up between the shovels.

Saw-Setting Anvil and Hammer

A set of tools such as are often used by saw setters may be made readily by mechanics. A hammer and anvil with gauges are shown in the sketch. The hammer is tempered and provided with a hickory handle. The anvil is mounted in an oak, or maple, block, or post, to be set on a bench, or on the floor. The latter is preferable, as it makes a more solid base. The anvil is fitted into the block deeply, and pins are driven through the side holes. The anvil, not receiving the blow of the hammer directly, may be left hard. Mild-steel pieces are fixed on each end

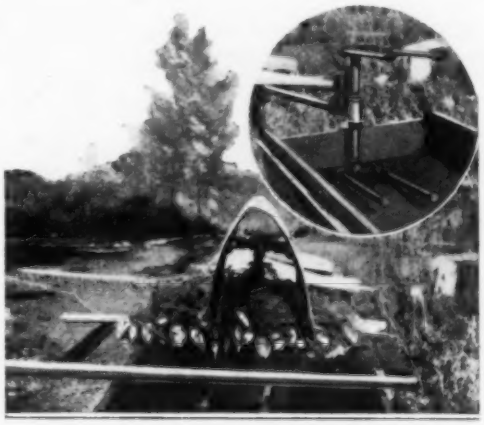


This Outfit Is Practical for Individual Use, or for Saw Setting as a Business

of the anvil, and adjusted for various sizes of saw teeth, which are set over the beveled edge of the anvil.—Donald A. Hampson, Middletown, N. Y.

A Rack for Washing Vegetables

A simple device for washing vegetables, and by the use of which a truck farmer was able to get better prices for his product, is shown in the illustration. It is made of gas pipe and connected to the irrigating system of the farm. A 2-in. pipe is connected to a smaller one and a cut-off is placed between them. A 1-in. pipe is connected to the cut-off and reduced to smaller connecting pipes on each branch. The water finally reaches four short lengths of pipe. On the upper side of the lower pipes and on the lower side of the two upper ones, small holes are drilled in a line. The small streams make two vertical sheets of water. The vegetables are placed on a screen, which is set on top of the trough. A cover of sheet iron is fitted over the pipes and the tray. It prevents the water from sprinkling on the person washing the vegetables.—M. Glen Kirkpatrick, Des Moines, Ia.



Better Prices were Procured for Vegetables Washed by the Use of This Arrangement

¶ Local reductions of density in photographic negatives may be effected by rubbing with a bit of old handkerchief dampened with alcohol. The cloth "bites" best when nearly dry, and two folds should be used over the end of a match for working in small areas.

Garage Roof as a Playhouse

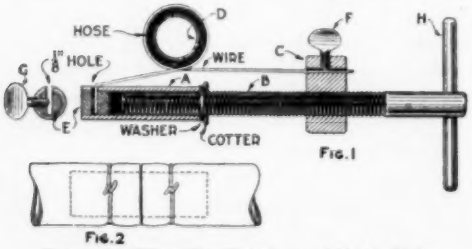
In building a garage in a small city lot, the roof was utilized to make up for the space taken from the play area

The Roof of the Garage was Fitted Out as a Useful Play Area and Recreation Spot

of the children, by building a pergola on it, as shown in the photograph reproduced. A high coping was built around the edge of the wall and an outside stairway provided. The space is very popular as an open-air room for the whole family, a safe play place for the children, and a cool recreational spot for informal little parties. Porch furniture was fitted to the playhouse and increased its usefulness.—Lee McCrea, Claremont, Calif.

Device for Repairing Water Hose

If breaks in rubber or fabric hose are repaired promptly, the life of the hose can be extended considerably. By

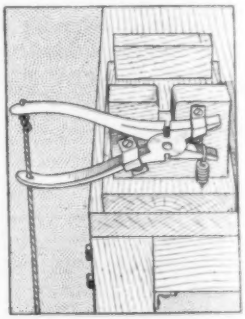


Draw the Wire Up Closely, and Lock It by Twisting the Device

the use of the device shown in the sketch, repairs of this kind may be made quickly and substantially. A short nipple is placed in the ends of the hose, as shown in Fig. 2, and binding wires fixed around them, by the method shown in Fig. 1. The wire tightener is made as follows: A short piece of ½-in. iron pipe, A, is fitted with a threaded bolt, B, which slides in it. A cotter is set through the bolt, and engages a washer at the end of the pipe A. A metal block, C, is tapped to fit the bolt B, and a hole is drilled in it for the wire, which is clamped by means of the thumbscrew F. The end of the pipe A is plugged, as shown at E, and a ⅛-in. hole drilled for the wire, clamped by the screw G. When the wire is in position around the hose D, the handle H is turned, and the wire drawn up tightly. The device is then twisted so that the wire is held securely around the hose and the nipple.—W. Drynan, Kansas City, Mo.

Foot-Lever Wire Cutter Made of a Plier

In cutting a large quantity of wire in short lengths, when only a hand cutting plier was available, considerable time was saved by rigging the plier with a foot lever and a gauge, as shown. The plier was mounted on a slotted block by means of two straps of sheet iron, and a spring was fixed to the lower jaw, and to the base block of the device. A hole was drilled into the lower handle and a cord from the foot lever was passed through it and fixed to the upper handle. The wire was passed through the slot, its end against the gauge block, and cut off by a light stroke on the foot lever.—James P. Lewis, Golden, Colo.



¶A large leather or rubber washer on the handle of a brush, used overhead, prevents the liquid being applied from dripping on the hand.

A Homemade Refrigerator
At Small Cost

by Charles A. King

AIR-PROOF walls, free circulation of cool, dry air, the purity of the ice, and the cleanliness of the ice chamber, are essential factors in the efficiency of a refrigerator. That described in this article, and detailed in the illustrations, was designed with these factors considered, and makes ample provision for the needs of a large family. It was built at a cost of $17.50. If it is kept well iced, the circulation of the air, which is fundamental, will be maintained by the rising of the warmer, and the falling of the colder, air. The interior is of spruce—whitewood or poplar are good—having no odor to affect milk or butter.

The stock bill, lumber listed in lineal feet unless otherwise specified, is as follows:

95 board ft. matched spruce; insides; ⅞ in., 10 and 16 ft. lengths.
85 board ft. matched pine; outsides; ⅞ in., 10 and 16 ft. lengths.
100 ft. strapping; furrings; ⅞ by 2 in.
18 ft. spruce; linings and furrings, corners of front; ⅞ by 2 in.
14 ft. spruce; linings and furrings, header and base of front; ⅞ by 4 in.
4 ft. spruce; linings and furrings under ice door of front; ⅞ by 5 in.
9 ft. spruce; linings and furrings for mullion; ⅞ by 2½ in.
9 ft. pine; corners of front; ⅞ by 3 in.
4 ft. pine; mullion; ⅞ by 2½ in.
7 ft. pine; header and base; ⅞ by 4 in.
4 ft. pine; under ice door; ⅞ by 5 in.
3 ft. pine; legs; 1¾ by 5¾ in.
3 ft. pine; legs; 1¾ by 3¾ in.
12 ft. pine; cap; ½ by 3 in.
12 ft. pine; base; ½ by 4 in.
30 ft. spruce; door jambs, milled; 1¼ by 2⅝ in.
30 ft. spruce; door frames, milled; 1⅜ by 2½ in.
50 ft. whitewood; shelves; ½ by 1½ in.
140 sq. ft. building paper.
1 sheet galvanized iron, No. 26 gauge; 28 by 96 in.
1 sheet galvanized iron, No. 26 gauge; 21 by 40 in.
1 lb. solder.
1 piece lead pipe, light weight; for waste pipe.
2 lb. sixpenny common nails.
1 lb. 2-in. tinned clinch nails.
2 lb. eightpenny common nails.
1 lb. sixpenny finish nails.
1 lb. eightpenny finish nails.
3 pair galvanized-iron hinges, 4 in.
3 lever door fasteners; galvanized, 4 in.
8 screws; 3½ in., No. 15; to fasten legs.
1 pt. shellac.
1 qt. paint.

First make horizontal frames C and D for the top and bottom, of 2-in. strapping, as shown in Figs. 1 and 3. Square them carefully to give a good support for the structure. Tack building paper for insulation on the inner side, and nail spruce lining boards over it. From the stock for the outside, cut pieces for the outer sides of the top and bottom, to project about 3 in. around the edges of the frames, as indicated at E, Fig. 3. Tack building paper upon the open side of each frame, and nail on a part of the boarding, leaving an opening for packing in the filling. The latter may be dry shavings, sawdust, mineral wool, paper, or other nonconducting material. When the filling is in place, nail on the rest of the boards. Bore a hole for the waste pipe F, centered 1½ in. from the end

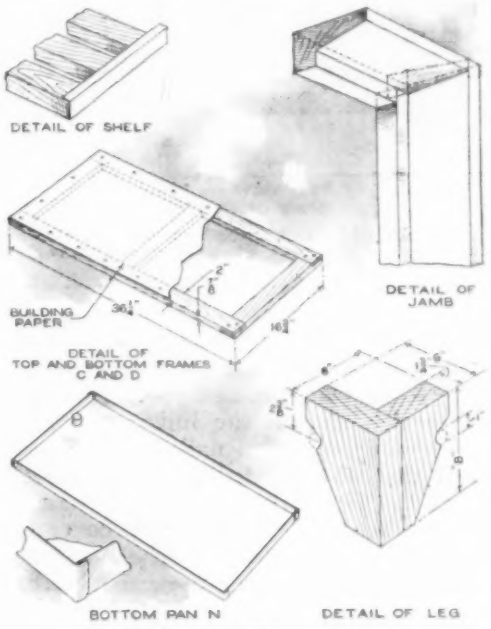


Fig. 1
Details of Several Constructional Features and Fittings

and 4¼ in. from the back edges of the lower frame.

Cut spruce lining, 4 ft. 4¼ in. long, to make a width of 6 ft., to cover the ments, as detailed in Fig. 3. Care must be taken that the door openings are square.

Cover the furrings of the ends with

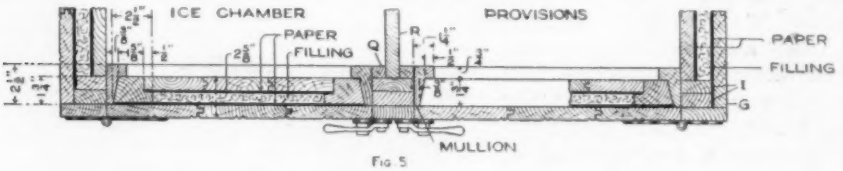
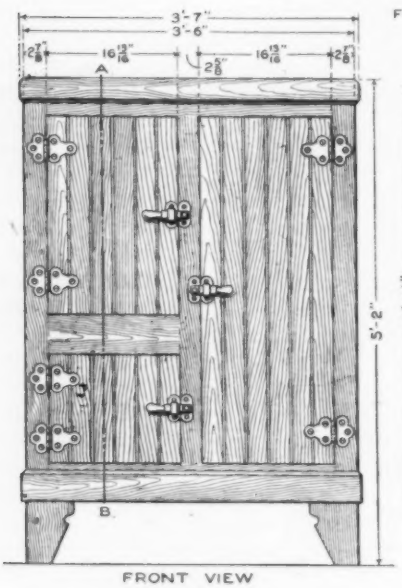
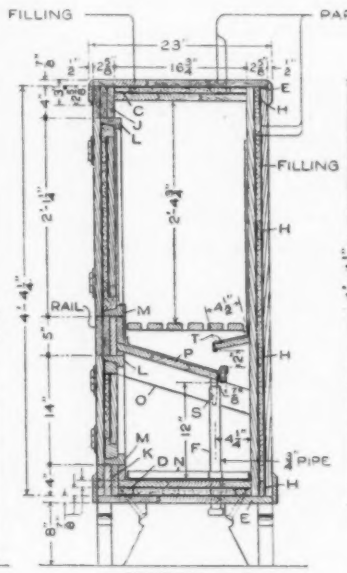


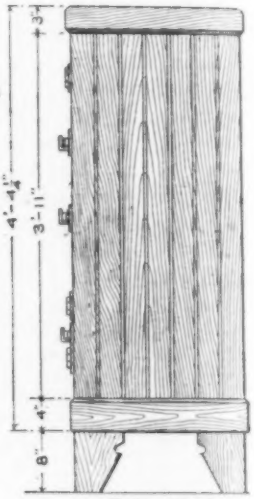
Fig. 5



FRONT VIEW
Fig. 2



SECTION A-B
Fig. 3



END VIEW
Fig. 4

The Working Out of the Parts and Their Assembling Involve Processes Which Are Comparatively Simple, If the Work is Done Systematically as Described

two ends and the back. Remove the grooved edge of one piece and joint it straight; nail it as the first piece of the lining at the front right corner G, Fig. 5. Set the top and bottom frames on end, and nail the lining on with eightpenny common nails. Make certain that the jointed edge is square with the inside surface of each frame. After the lining is in place, cover it with sheathing paper. Nail on the furrings H, clinching the nails in the middle ones on the outside.

Make the corner strips I, Fig. 5, the width shown. The linings J, above, and K, below the doors, are fitted as shown in Fig. 3. The mullion is built up, as detailed in Fig. 5, and the rail between the upper and lower compartsheathing paper, and pack the spaces with insulation. Fit and nail the headers L, and thresholds M, of the door jambs, matching the corners as detailed in Fig. 1. The bottom pan N, as shown in Fig. 1, should be ⅜ in. narrower and shorter than the bottom of the inside of the refrigerator. Nail the pan around the top edge with tinned nails. Set the waste pipe F through the bushing of the pan and the hole in the bottom, in nailing the edges of the pan.

The interior of the refrigerator is fitted next. Nail in cleats O, Fig. 3, supporting the ice floor P, of spruce, and cleats similar to those at Q, Fig. 5, on the back, to receive the fence R. The latter is of spruce, fitted horizon-

tally, and extends 6 in. from the top of the interior. A ¾-in. hole is bored in the ice floor to receive the thimble S, fitted into the top of the waste pipe.

The measurements of the metal protection for the ice chamber are next taken. Every part that comes in contact with the ice should be covered. The iron lining on the inside of the door fits between the jambs when the door is closed. After the ice pan, on the floor P, is fitted, the hood T is nailed in, and its iron covering fitted. A trap is fitted on the lower end of the waste pipe F, to prevent the escape of cold air. The making of the metal interior should be left to a tinsmith, unless one is experienced in this work.

The trim on the front is built up in one piece, and fitted into place after the interior is complete. The door frames are fitted to allow for swelling, 1/16 in. on all sides. The doors should be fitted tightly against the rabbet of the jamb, and should not bind on the sides. The fronts of the doors are put on with screws from the back of the rabbets of the door frames. Line and fill the doors as shown in Fig. 5. The cap and the base moldings are mitered and nailed on. The legs, detailed in Fig. 1, are fastened with screws. The trimmings may be of galvanized iron, brass, or bronze. The shelves, detailed in Fig. 1, are made of slats and are bound with iron. Parts of the lining not covered with iron are shellacked two coats, and the outside is suitably finished.

Leather Pattern Fillets Set in Shellac

Thick orange shellac should be used in setting leather fillets in patterns, in preference to glue, as the moisture from the wet sand tends to loosen the leather. Both the fillet and the corner are shellacked with several coats before applying the fillet, which is rubbed in with a round stick of suitable size.

¶In painting or finishing wooden rods, small patterns, etc., it is convenient to hold them by brads driven in the ends.

Improvised Rigging for Lifting Heavy Machine

In an engine room where there was no crane it was found necessary to remove the armature of a 75-kw. alter-

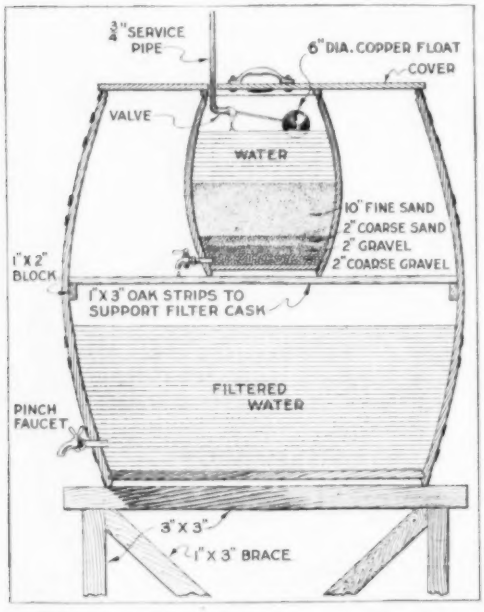
This Support for Differential Tackle was Devised in an Emergency for Taking Down a Generator

nator and the upper part of its frame. The roof timbers could not be depended upon, and a tripod derrick would lift but not swing aside the armature.

An improvised crane was erected by using two 4 by 8-in. timbers, rigged as shown. One end of the joined timbers was inserted into an adjacent wall, and fastened with a slanting brace. The other end was supported on a strongly braced horse. Two 10-in. diameter pulleys were mounted on a steel bar, the outer ends of which were secured by cotters. A chain was run over the bar to form a short loop, to which the differential block was hooked. The frame was unbolted and the upper part raised 1 ft., and rolled beyond the base, where it was set down. The armature was next lifted and shifted to a truck.—H. S. Rich, Poughkeepsie, N. Y.

A Barrel Water Filter

A filter, which was constructed for use in a summer camp, and which can be used in various sizes for other situations, is shown in the illustration in a vertical sectional view. A cask of



The Water is Filtered through the Layers of Sand and Gravel, and Stored in the Reservoir

about 15-gal. capacity was used as the filter tank, and partly filled with gravel and sand, as indicated. The service pipe was fitted with a check valve operated by a copper float and lever arm. The cask is supported in the larger barrel or reservoir by two oak strips, the water from the filter flowing down into the reservoir, and being drawn from it at the pinch faucet.

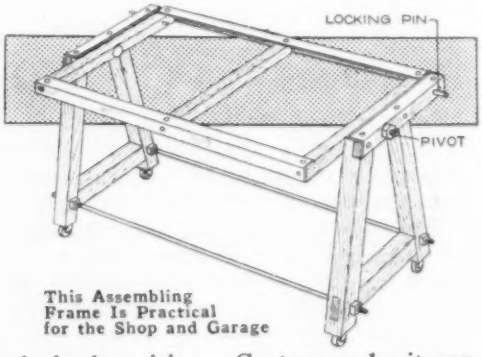
The cover of the reservoir is made in two parts, so that it may be removed from around the service pipe. Where water is not available through a pipe line, it can be poured into the filter from pails. The supporting frame is of oak, strongly braced. The reservoir should be painted inside with tar, such as is used in damp-proofing. The sand, particularly the upper portion, should be replaced from time to time.—John E. Cahill, Jr., New York, N. Y.

Painting Iron to Withstand Wear

Iron should be painted immediately after being cast or fabricated, if the best results in protection by the paint are desired. The paint should be applied in a dry wind or the warm sun, rather than on a damp day or at times of the day when the air is damp. The surfaces to be painted should be free from rust. A first coat of red lead and linseed oil is applied and permitted to dry hard. Two or three additional coats of red or white lead are then applied. If the iron is old, the paint should be burned off, rust and scales removed, and a coating of turpentine applied. Then the process is the same as with new iron.

Frame for Assembling or Examining Automobile Engine

An automobile engine is hard to handle when being assembled, repaired, or tested, unless a device is provided by which it can be reached at any part. The frame shown in the illustration is useful for the garage or shop, and is made of heavy wood, braced with iron rods and protected at the points of wear with angle iron. The engine is mounted on the frame, which is pivoted at its ends. A locking pin at each end steadies the frame. When it is desired to get at another part of the engine the frame may be turned and locked at the

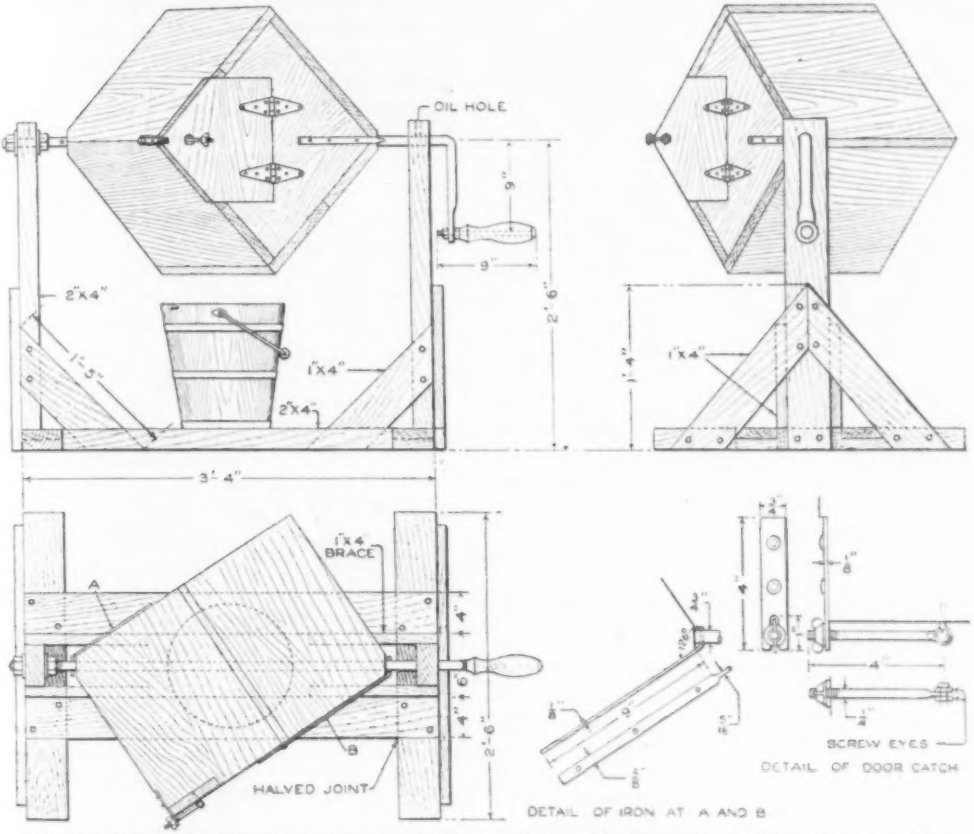


This Assembling Frame Is Practical for the Shop and Garage

desired position. Casters make it convenient to move the frame from place to place.—R. L. Hervey, Washington, District of Columbia.

A Revolving Feed Mixer

The mixing of feed for poultry, stock, and other animals can be done quickly and thoroughly by means of the homemade mixer shown in the detailed drawings. It consists essentially of a box of ⅞-in. lumber, inclosing a chamber in the form of an 18-in. cube, mounted diagonally on a shaft, and supported by a wooden stand. The detail dimensions may be varied, but the main sizes indicated are such that the device can be handled conveniently. The feed is inserted at the hinged door, and the shaft is turned by means of the crank. The supporting stand is of 2 by 4-in. stuff, strongly braced, and bored to carry the shaft. Metal fittings are provided for the chamber, as shown in the detail sketches. The iron strips at A and B are formed into a pin at one end, and this is bent and set in the shaft, holding the chamber in place. The door catch is a bolt hinged between two screw eyes, and provided with a wing nut, by means of which the door is clamped at the notched strip of iron at the corner. In any case, the device should be set high enough so that a bucket or feed box may be set under the mixing chamber.—Gus Hansen, Peachland, Canada.

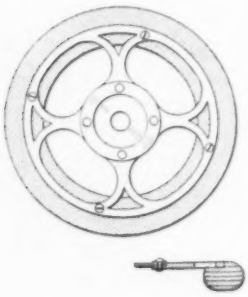


The Front and Side Elevations, Above, and the Plan, Below, Show the General Structure; the Metal Fixtures are Detailed in the Smaller Sketches

¶Drain tile and similar products are awkward to carry, and a convenient method of handling them with slight breakage is by the use of an iron bar, bent U-shape to form a handle. One end of the bar is inserted in the tile and the other serves as a grip.

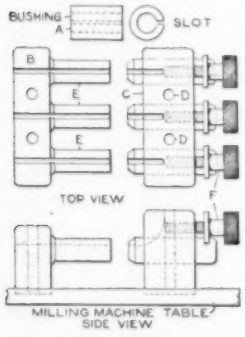
Boat's Wheel Made from Bicycle Sprocket

By mounting an old bicycle sprocket wheel on a wooden ring, cut from a board glued up of several layers, as shown in the sketch, I made a steering wheel for a motor-driven canoe which gave complete satisfaction. The veneered stock was obtained from an old tea-shipping case and was built up to a thickness of 1 in. The wheel is 9 in. in diameter, and the wooden part was varnished, rubbed down with steel wool, and given a high polish. A piece of ¾-in. pipe was used as the shaft, and the wheel was locked to it with locknuts. —B. E. Dobrée, Battleford, Canada.



Jig for Slotting Bushings on Milling Machine

The slotting of three bushings, A, at once, on the milling machine is accomplished by the use of this jig. Part B is bolted to the milling-machine table; part C is also bolted down, at the holes D, but must be loosened and moved back when the work is changed. The bushings are held on the pins E, which are a trifle shorter than the bushings. The bushings should fit snugly on these pins. The adjusting screws F are used to tighten the bushings and take up any slight variation in length. The stop should be set to prevent the saw from going through member C.—C. Anderson, Worcester, Mass.

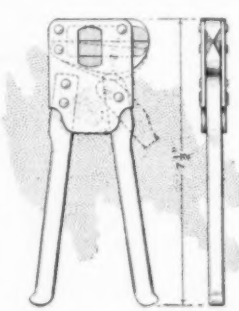


Garden-Hose Rollers for Graining Woodwork

Short sections of rubber-surface garden hose can be made into satisfactory rollers for use in graining woodwork by cutting rings around the hose carefully, in imitation of the grain of the wood. The hose may be mounted on a wooden roller and fitted with a handle. Used in this way, it is best to make the wood grain fairly straight. The hose may also be cut to give several strips on the surface, extending its length, each strip being notched to produce a grain effect in varying sizes, when drawn over the woodwork.

Cutting Pliers for Tool Room

A powerful cutter for cutting screws to length without injuring the thread was made in a tool room, as shown in the sketch. The side plates are of wrought iron and the handles and cutters are of tool steel, tempered. Machine screws may be used instead of rivets, and the cutters removed easily for sharpening. The outside cutting edge is not essential but gives the tool a wider range of use.



Preventing Rapid Rusting of Auto Fenders

It is not uncommon to observe automobile fenders through which holes have rusted and which are loose at the fastenings. To prevent this and to give the fenders longer life, wash the mud and dirt from under them frequently. A rust preventive, or any suitable oil, will aid as a preservative, but the most important precaution is to prevent the accumulation of mud, under which the rust soon forms.—C. H. Thomas, Kennett Square, Pa.

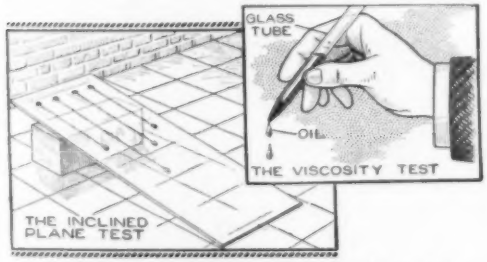
Testing Oils for Lubricating Qualities

The user of lubricating oils should have a knowledge of their merits and this can be gained readily by a series of simple tests, shown in the illustrations. One of the chief characteristics of lubricating oil is its tendency of gumming into a resin by oxidation, rendering it unfit for lubrication purposes.

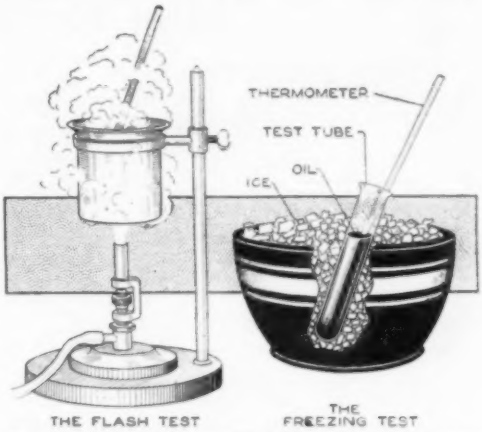
A simple test can be made by elevating a sheet of glass, 2 by 4 ft., 6 in. at one end, thus forming an inclined plane. A drop of oil from each sample under test is put at the top of the plane. The drops should be placed several inches apart so that they will not spread into each other. A notation is made of the progress of the oil as it flows down the plane, several days being necessary to complete the experiment. It is desirable to make a record of the flow every six hours. The oil flowing the farthest has the best body. The oil under test should be kept free from dust, under cover if possible.

To test the fluidity of oil, heat a piece of $\frac{5}{8}$-in. glass tubing to a red heat, draw out one end to a diameter of $\frac{1}{16}$ in., and cut it to a length of 4 in. Fill it with the oil and note the time required for all of it to drip out at the small end. Repeat this with each sample to learn the relative viscosity.

Oils for gas or oil engines should be selected for their ability to pass successfully the "fire test." A metal cup of ½-pt. capacity is filled with oil and heated to a high temperature. A thermometer is held continuously in the oil so that the temperature at the "flash point" can be determined. As the temperature approaches a high value, pass a lighted taper back and forth across the top of the cup, ½ in. above the smoking oil. The moment the rising gas "flashes," then goes out, and "flashes" again, note the temperature immediately. This is called the "flash point." Continue to heat the oil until it bursts into flame, and continues in this state. Read the temperature again. This value is known as the "fire point." These two tests are especially valuable in selecting oil for high-speed tool work where the temperature is often high. These tests should be made only in a suitable shop, or a laboratory, and proper precautions against fire taken.



Ease of Flow Is an Important Factor in Determining the Lubricating Value of Oil



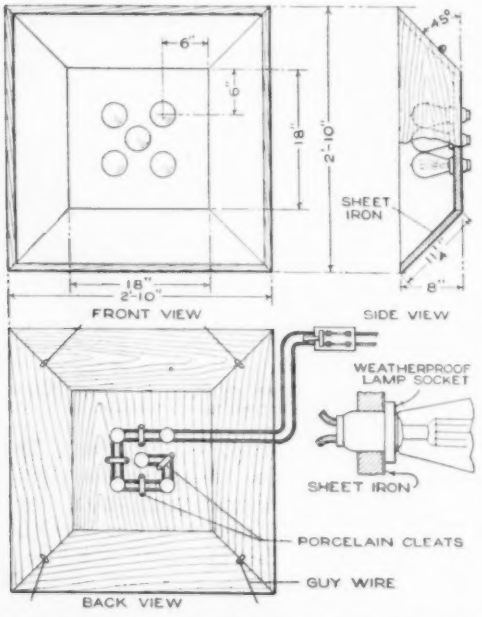
The Flash and the Freezing Tests Are Both Important in Grading Oils for Lubrication

To ascertain the freezing point of an oil, fill a test tube and place it in a vessel of crushed ice. If the oil, which should be continually stirred with a thermometer, does not solidify at this temperature, salt should be mixed with the crushed ice. The moment the oil solidifies, read the temperature, for the "freezing point."—K. M. Coggeshall, Webster Groves, Mo.

¶Wax applied to the bottom of cleats, supporting temporary walks over newly finished floors, will prevent the cleats from sticking.

Reflector for Flood Lighting Construction Work

On a large construction job much of the work was done at night. The problem of providing good illumination



This Cheaply Constructed Reflector Proved Useful in Illuminating a Large Construction Job

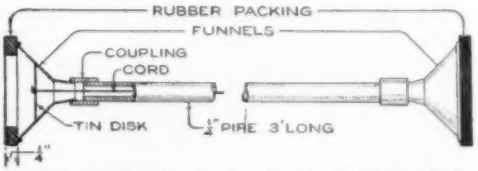
was finally met by the use of the flood-lighting reflector shown, because of the considerable cost of metal fixtures with glass, or porcelain, reflectors. The inside of the reflector was covered with thin sheet iron, and weatherproof lamp sockets were set in place, as shown. The wiring was done on the back. The inside surface was painted with two coats of white enamel and the outside with red lead. The reflectors were fitted with 100-watt nitrogen-filled lamps and suspended on wires, to project the light as desired, and guyed to prevent swinging. Before blasting, it was only necessary to unhook the suspension wires, placing the reflectors flat, planks protecting them from heavy fragments of rock. One of the reflectors was mounted on the boom of each derrick, making the skip, or bucket, plainly visible.—T. S. Burns, Elmira, N. Y.

Electric Pad Warms Auto Radiator in Garage

In order to prevent the freezing of the water in the radiator of an automobile, stored in an unheated garage, an electric heating pad was used. The pad was flexible, 12 by 15 in. in size, and was connected to the light socket. With the current turned on to "low," ample heat was provided to prevent freezing, at a cost of about six cents a day.—C. E. Drayer, Cleveland, Ohio.

Device Locates Pounding in Engine or Machinery

Better satisfaction is given by the homemade device shown in the sketch in locating "knocks" in engines and machinery than anything I have yet found. It was made as follows: Two small funnels of metal were fitted into the ends of a 3-ft. length of ¼-in. pipe, and a coupling was placed over the joints. Tin disks were soldered into the funnels, as shown, and a cord was drawn tightly through the pipe and tied at the centers of the disks. A ring of rubber packing, with a 1½-in. circular opening in the center, was cemented to the upper edge of each funnel. By placing the packing ring on the engine, or machine, under inspection, a slight pounding in it will be heard distinctly at the other end of the device. Care



Pounding in Machinery may be Heard Distinctly by the Use of This Telephonelike Device

must be taken that the cord is taut, and does not touch the pipe.—R. S. Matzen, Fort Collins, Colo.

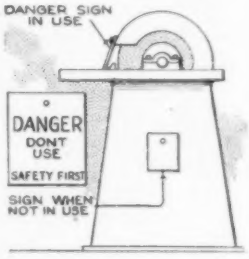
¶A small V-shaped notch cut in one jaw of a vise, ⅛ in. deep, will be in no way objectionable for other work, and has many uses. It gives a three-point bearing on work held vertical.

Clip Supports Brush in Pail

Paint brushes are injured by being permitted to stand in the paint pail when temporarily not in use. By fastening a small metal clip to the side of the brush on the wooden part above the bristles, the brush may be hung on the edge of the can or on a wire stretched across it, the bristles hanging straight instead of being curled against the bottom of the pail.

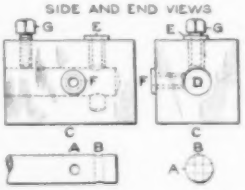
Danger Sign for Unsafe Grinding Wheel

A workman cannot readily observe whether a grinding wheel is damaged or unsafe, particularly when the wheel is properly hooded. A safety measure used in a large shop is that suggested in the sketch. When a grinding wheel is found to be unsafe, a red danger sign, usually kept on the side of the machine, is fastened to the front of the grinder.—J. R. Minter, Washington, Indiana.



Jig for Drilling Holes at Ends of Shafting

Holes like A and B, as shown in the sketch, near the ends of sections of shafting, and at right angles to each other, were drilled by the use of the jig shown. The body C is of steel with a hole for the shaft D, and drill bushings E and F. The setscrew G keeps the shaft in place while the first hole is being drilled. After one hole has been drilled, a pin is inserted, counteracting the tendency to twist the work on the second hole.—L. J. Hansen, Chicago.

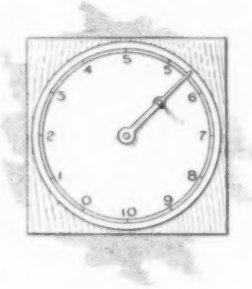


A Sawhorse Tool Kit

For mechanics, carpenters, or for use in odd jobs around the home or shop, the sawhorse tool kit will be found useful. It serves the double purpose of a convenient container and carrying case, and a lightweight horse. The trestle is of the common form and the tool kit is built into it by paneling the ends and one side, around a lower shelf.—J. B. Butler, Morganfield, Ky.

Decimal Dial on Shop Timekeeping Clock

A large structural steel and bridge company has adopted the dial shown, for timekeeping clocks. Zero is at 7 a. m., the start of the day's work; 5 at 12 a. m. and 1 p. m., the lunch hour; and 10 at 6 p. m., the end of the day's work. A single hand is used, and the hours are divided decimally, simplifying timekeeping on the various jobs.—Peter W. Seiter, Kansas City, Mo.



Keeping Dirt Out of Scale Pit

Discarded rubber belting was fastened to the frame around a scale pit, and lapped over the platform, as shown, to prevent gravel, dirt, and other small particles, from working down into the scale pit. The rubber belting does not interfere with the scale in weighing.

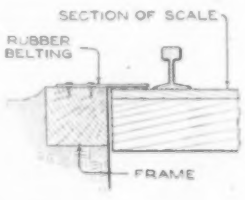
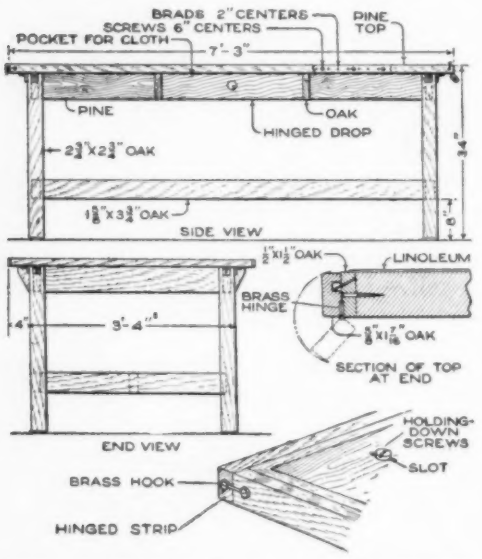


Table for Mounting Drawings on Muslin or Backing

A good method of mounting muslin backing on a drawing, or blueprint, is as follows: Stretch the muslin on a board, or table, as shown, and tack it around the edges. The stretching should be uniform and should not distort the fabric. Dip the drawing to be mounted in water for about a minute and remove the surplus water between blotters. Place it, face down, on the table and evenly coat the back with paste. Turn it over, put the muslin on, and roll it down flat, working from the center outward. A mounting table, large enough to hold eight or a dozen drawings, is of great assistance, and can be used for other purposes as well. The table, shown in the drawing, is covered with linoleum, an excellent top. When it is desired to mount drawings, a hook at each corner is unfastened, permitting an oak strip on each side to drop down, exposing a row of sharp points, as shown in the detail. The muslin is stretched over these points, which are hidden when the table is used for general purposes.—John D. Adams, Phoenix, Ariz.



This Large Table, Designed for Mounting Drawings Quickly, Is Also of General Use

¶A piece of corrugated cardboard is a convenient drier for photographic prints, the ends of the prints being arched in the corrugations, giving a current of air easy access.

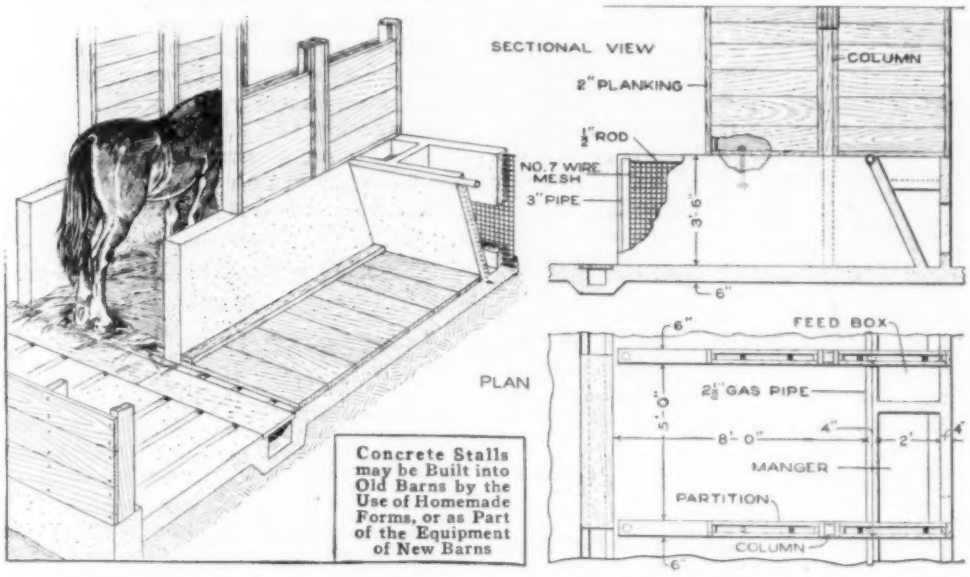
Horse Stalls of Concrete

By W. E. FRUDDEN

Serviceability and sanitary considerations make concrete desirable for the building of horse stalls. The illustration shows stalls of this type that may be built into a new structure in various units, or fitted in an old one. The floor, drain trough, feed box, manger, and partitions are built as a unit, and wooden partitions are set above the concrete sections. A removable plank floor in the stalls gives the horses foot comfort, not possible upon even a heavily bedded concrete floor. The concrete partitions and the mangers are reinforced with wire mesh and steel pipes. The front edge of the manger is also guarded with a pipe, so as to prevent undue wear on the harness. The edges and corners of the exposed concrete should be rounded off so as to prevent injury to the horses from accidental contact in entering and leaving the stall. A stall in use and another in section are shown to the left in the sketch; a plan view is shown at the right, together with a detailed sectional view of the construction of the partitions and manger.

The floor is laid down first, and of the same material used for the other concrete portions, a 1 to 2 to 4 mixture. A weaker mixture may be used for the floors if there is a considerable area to be laid. The drain trough, 6 by 6 in. in section, is cast with the floor, a box of ⅞-in. stock being fitted into the floor as a mold. The shallow drain grooves may be tooled into the

surface, and the offsets at the top of the trough are provided by strips fixed to the trough mold. The 3-in. pipe, reinforcing the partitions at their rear ends, is set into the floor when the latter is laid, and it is desirable, also, to set the lower edges of the wire-mesh reinforcement into the floor.



Concrete Stalls may be Built into Old Barns by the Use of Homemade Forms, or as Part of the Equipment of New Barns

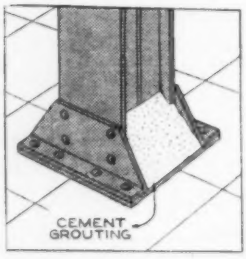
Wooden forms are provided for the partitions and the manger. These should be built to be taken apart readily so that they may be used repeatedly. The form for the partition is a box in which the wire mesh is supported, taut and carefully centered, the mixture being poured into it and leveled at the upper surface. The forms for the manger and feed box should be set into place and fixed to the partition forms before any of the forms are filled. The inside of the manger is formed by a tapered box resting upon the floor. The feed box is poured around a similar but smaller form, and the portion below it is cast hollow by inserting a form, which remains in place after the concrete is poured into the molds. A 2½-in. pipe is set into the front edge of the manger, its ends being imbedded in the partitions, to protect the horses from the edge of the manger and to prevent heavy wear on the harness. Bolts to support the upper portions of the partitions are set into the concrete, as indicated in the sectional view.

The mixture must be freshly mixed and thoroughly wet when being poured, in order that the molds may be filled properly. If necessary, the aggregate may be tamped into the molds slightly. The forms should be left in place three days, and then removed carefully, so as not to damage the concrete. Sprinkling the work occasionally, several days after the forms are removed, is also desirable as an aid in uniform drying. The surfaces should be smoothed by removing imperfections in the molds, and a mixture of cement and water should be brushed over them to produce a satisfactory finish, when the molds are removed. The work may be surfaced and troweled smooth if desired, but this is not essential.

The floor planking is laid crosswise and spiked to 2 by 4-in. pieces set at the sides of the stall. This arrangement makes it convenient to replace pieces of the planking where the greatest wear occurs, and the planking may be removed readily for flushing of the stall.

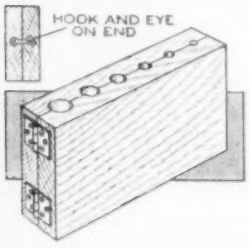
Dirt-Collecting Corners Filled with Cement Grouting

Column footings and similar corners in a factory were filled with cement grouting, as shown, overcoming the unsightly dirt accumulations. The floor may be washed with water from a hose, in many instances, and the fire risk from inflammable materials collecting in corners is reduced, and sanitation promoted.—Roy H. Poston, Flat River, Mo.



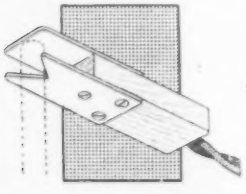
Vise Pads for Polished Tubing or Rods

If a length of highly polished pipe, or rod, is placed in a metal vise, it is usually marred or dented. The pads shown eliminate this. The holes are bored in a suitable board, about 1½ by 6 by 18 in., which is then sawed in two, as indicated, and hinges and a hook and eye are attached. It may also be given a coat of shellac. —Arthur W. Dahl, Superior, Wis.



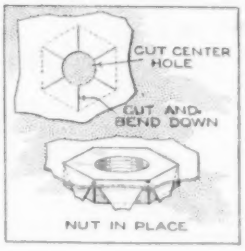
An Electric Gas Lighter

For lighting gas burners used intermittently, the lighter shown in the sketch was found satisfactory. A piece of wood, ⅜ by ¾ by 3 in., was provided with two pieces of metal, and the two conductors were connected through a central hole to them. The other ends of the cord were connected to a 110-volt lighting circuit, in series with a small choke coil. When it is desired to light the gas, it is only necessary to turn it on and then place the lighter over the tip of the burner, moving it slightly to produce sparks. A coil of 10 or 15 ohms, having an iron core, will produce a sufficiently hot spark without endangering the usual 10-ampere fuse. The two metal contact pieces should be taped except on the ends projecting from the wooden handle.



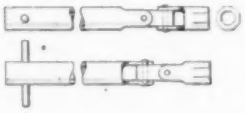
Soldering a Machine Nut to Sheet Metal

In fitting a can to receive a tap it was necessary to solder a nut securely to it and the method described was used. It has numerous other applications. The nut was placed on the metal and a line drawn around it, as shown. The center hole was cut and the six portions of the hexagon were cut and bent down. The nut was supported by them and soldered into place. A very strong fitting resulted. —J. H. S. Cronk, Woodstock, Canada.



A Flexible Socket Wrench

For use in places where an ordinary wrench cannot be applied, a flexible socket wrench is useful. It is a homemade device, the socket portion being formed from a short piece of iron pipe and the other sections from steel pipe. It may be made in various sizes and provided with several sizes and shapes of sockets, which can be fixed into place as desired, by means of the pin.—Charles C. Brabant, Detroit, Mich.



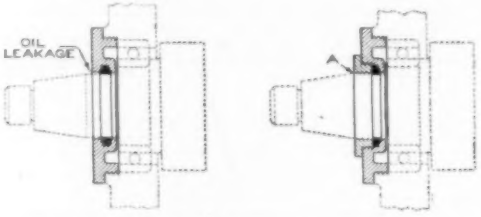
Putty for glazing should contain 10 per cent of white lead to withstand the weather.

Japanese Finish for Spruce

A finish used on spruce by Japanese craftsmen is produced by the application of dilute sulphuric acid, after which the surface is charred slightly. The acid is permitted to dry and the wood is then held over a hot stove, until the surface is well blackened. The charcoal surface is brushed off thoroughly, and the surface oiled with linseed oil and beeswax. The harder grain appears black and the rest has a rich brown tone.

Preventing Oil Leakage in Gear Box

Occasionally trouble is experienced from leakage of grease or oil out of the ball bearings of an automobile gear box, as shown in the sketch at the left. This is usually due to the failure of the felt ring within the ball-bearing nut to press closely around the shaft. Such a condition was overcome by turning out one side of the nut that holds the felt packing, and threading it to receive

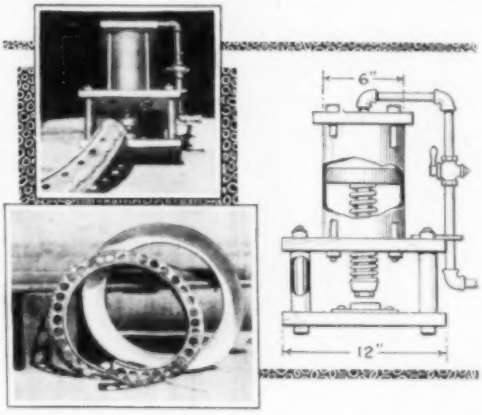


Leakage of Oil from an Automobile Gear Box was Prevented by Fitting a Pressure Nut against the Packing

another nut, A. The latter, when drawn up properly, forces the packing ring against the shaft, preventing leakage at this point.

Compressed-Air Punch for Cutting Washers

A punch for making washers, and the automobile tires from which the latter were cut, are shown in the illustration. The punch is operated by compressed air. The cylinder is 6 in. in diameter and the piston has a stroke of 3 in. A heavy coil spring in the cylinder, directly under the piston, lifts the punch after it has cut a washer. The lower spring strips the washers from the punch. The lever on the two-way cock controls the air, and when

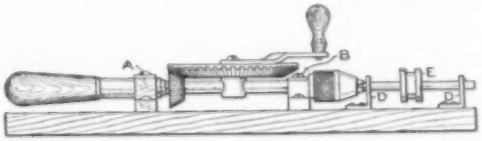


Old Automobile Tires were Cut into Washers with This Device

pulled down, permits the air to force the piston down for the cutting stroke. When the lever is raised, the air escapes as the spring lifts the piston. Tire casings were used with this device to make packing washers for oil-well pumps, and washers for other uses can be made similarly.—F. R. Shepherd, Fellows, Calif.

Hand Drill Used as Lathe

An ordinary hand drill was used effectively as a small lathe in turning a number of brass pulleys, by rigging it as shown. Two wooden bearings with metal strips, A and B, hold the drill firmly on the baseboard. An arbor is held in the drill chuck, and supported on two metal angles, D. The pulley

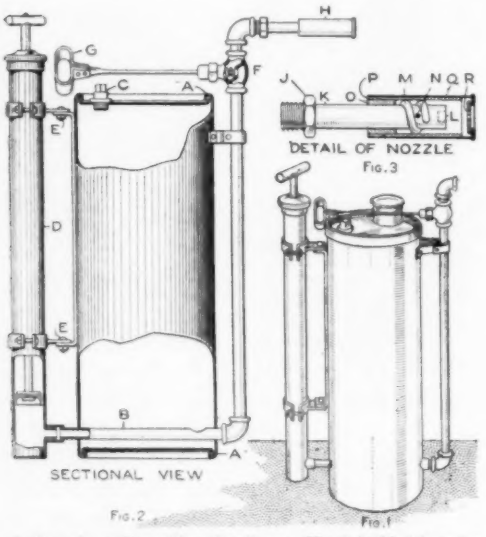


Small Brass Pulleys were Turned by Means of This Makeshift Lathe

E was drilled and forced on the arbor, and a suitable support for hand-turning tools was provided.—R. C. Fulton, Scarsdale, N. Y.

A Garden Sprayer of Varied Uses

Primarily for use in spraying plants in a garden, the sprayer shown in the sketch, Fig. 1, and made at small cost



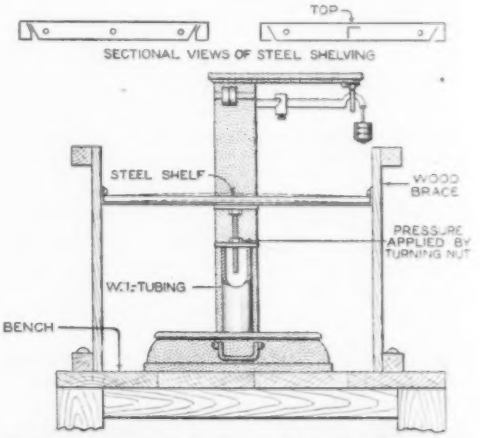
A Revolver Cartridge Shell was Used in Making the Nozzle of This Handy Garden Sprayer

in the home workshop, is useful also in the garage, on the farm, and for other purposes. The tank A, Fig. 2, is 5 by 14 in., and operates satisfactorily at a pressure of about 15 lb., when used with ordinary liquids for plants. It is made of No. 26 gauge galvanized iron, the ends being riveted into place. It is filled at the pipe plug C. The pressure pipe B extends through the tank, and is connected to the pump D, a ball valve, originally in the connecting tube when the pump was used as a foot bicycle-tire pump, being at the junction, and controlling the back pressure. Straps E support the pump.

The liquid passes through the tube B to the valve F, controlled by the handle G, convenient to the pump, by which the sprayer is carried. When the valve is opened, the liquid is driven into the nozzle H, which is shown in detail in Fig. 3. The threaded ⅛-in. nipple J fits into the elbow, and is soldered to the 3/16-in. copper pipe K, which is plugged at the end L. A 1/16-in. hole, N, is bored in the tube, and two turns of brass wire, M, soldered into place, produce a spiral course for the spray. The brass tube O, soldered to the tube P, is set on the tube K, with a tight fit. The cap Q is a .38-caliber, long cartridge shell, sliding tightly on tube P. The end of the shell is drilled out, and the disk R, having a 1/16-in. hole, is soldered into place. In filling the tank, sufficient air must be left in it to afford the proper possibility for compression. The parts, especially of the nozzle, should be cleaned after use.—T. T. Sturgeon, Los Angeles, Calif.

Test of Steel Shelving for Deflection

A manufacturer of metal shelving desired to test it as to deflection under various loads. No special apparatus was available, and the arrangement shown in the sketch was devised for the purpose. The shelving, which was of various types, was supported on a wooden frame bolted to a bench. A scale was set into place below it, and a simple jack made by setting a bolt into a washer in the top of the tubing, as



Shelving was Tested for Deflection under Load by Means of This Simple Rigging

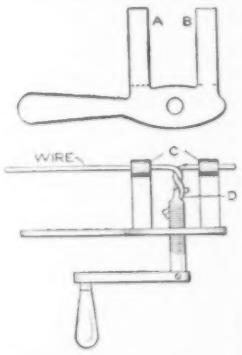
shown. The pressure was applied by means of the screw and nut, and the shelves were deflected under a load specified for each size.—K. George Selander, Jamestown, N. Y.

Painting Quick-Drying Cloth Signs

Where cloth, or muslin, signs are wanted for temporary use, exposed to the weather, letter them with a paint made without oil. Use dry colors of fine quality and grind them with varnish or japan to a thick paste; then thin out with benzine when ready for the work. If too thin, the paint will spread. Use a sign writer's one-stroke brush, and if especially good wearing qualities are desired in the paint, add a small quantity of boiled oil to the letter color.—A. A. Kelly, Malvern, Pa.

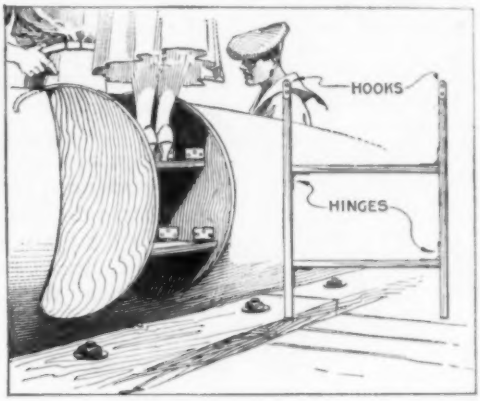
Device for Tightening Fence Wire

A large length of loose fence wire was tightened by the use of the device shown in the sketch, made for the purpose. A piece of ¼-in. iron was shaped to form a handle, and the two ends A and B were bent at right angles to it to form the upright parts. These may also be made by riveting pieces to the handle portion. Their upper ends, at C, were formed into eyes, left slightly open. A hole for the threaded crank was made in the handle section, and the pointed end of the screw bent into a hook, at D. The wire is tightened by looping it over the hook and turning the crank.—R. S. Matzen, Fort Collins, Colo.



Collapsible Steps for Boarding a Boat

Boarding steps for launches and small yachts are often bulky to stow away on the craft. The type shown in the sketch packs flat, takes up little space, and is safe and substantial. The sidepieces, of ⅞-in. hard wood, are curved to fit the sides of the boat. Two iron hooks, the proper shape to fit over the gunwale, support the steps. The treads are 18 by 10 by ⅞ in., placed 12 in. apart. They are set horizontally by hanging the sidepieces in

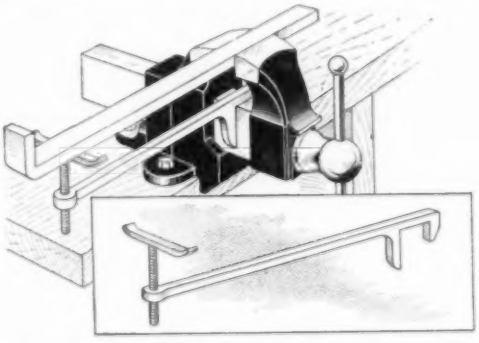


The Steps Fold Flat for Convenient Storage on Board the Craft

place, and marking the proper position. Strap hinges are fixed as indicated, and rubber treads provided.—L. B. Robbins, Attleboro, Mass.

Support for Long Work in Vise

Blocking-up, or other makeshift, methods of supporting long work in a vise were discarded in a shop, in favor of the simple arm fitted to the sliding member, as shown in the illustration. The device is especially useful on a pivoted vise, since it revolves with the



This Simple Support Makes Unnecessary the Blocking Up of Long Work in a Vise

latter. The extreme end is provided with an adjustable screw to fit irregular work.—S. L. Wade, Montgomery, Alabama.

Cushion for Charging Pan of Concrete Mixer

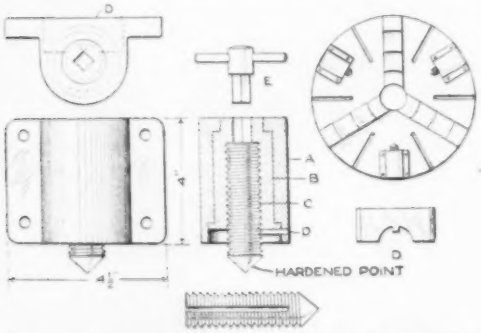
Cable breakages on the lifting rigging and damage to the charging pan of a concrete mixer were avoided by the use of a spring cushion made of two wagon springs, mounted as shown in the illustration. Sections of rubber hose were

Damage to the Charging Pan and Rigging was Avoided by the Use of a Spring Cushion

nailed on the top of the upper board of the cushion as a further protection to the charging pan.—J. J. O'Brien, Buffalo, N. Y.

Auxiliary Jaws for Center and Turret-Lathe Chucks

In turning a number of castings which were too large for the ordinary-size lathe chuck, it was found desirable



This Auxiliary Fitting for a Chuck Made Possible the Handling of Large Castings in a Lathe

to make a set of auxiliary jaws, which were fastened to the face of the chuck, as shown in the sketch. The casing A is made of soft steel, the sleeve B, of steel, tempered at the upper end, which is provided with a socket for the wrench E. The screw C is of tool steel, tempered at the point, and has a keyway, as shown, which extends longitudinally at the back of the casing. This keyway engages the key D, which is set in a slot at the back of the casing and has its back edge flush against the face of the chuck. The screw is adjusted by means of the wrench E, which causes the sleeve B to revolve. —G. T. E., Pittsburgh, Pa.

Tightening a Loose Bushing

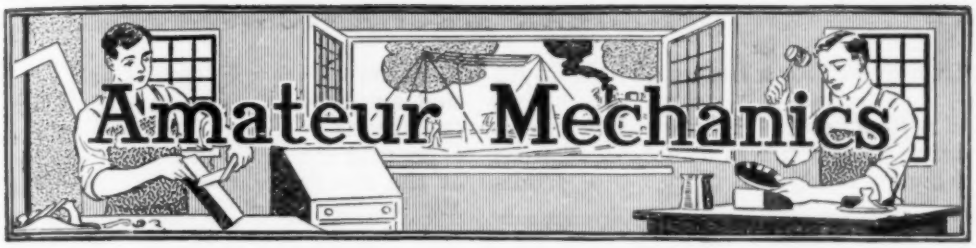
Sometimes, after pressing bushings into their places, they are loose and turn when an attempt is made to ream them out. In this case, remove the bushing, and run a coat of solder around the outside of it. Force the bushing back into place and the excess solder will be scraped off and a tight fit will result, with no turning of the bushing in reaming it.—J. W. Reynolds, Mason, Ill.

Kink in Cultivating Small Corn

When corn is small, it is difficult to do a good job of cultivating it, because of the tendency to cover it with earth. By wrapping the shovels of the cultivator next to the row with binder twine, the dirt is not pitched on the small corn, and it is possible to work close to the plant, the binding aiding in breaking up the lumps of soil.—Irl R. Hicks, Moberly, Mo.

A Polished-Black Wood Finish

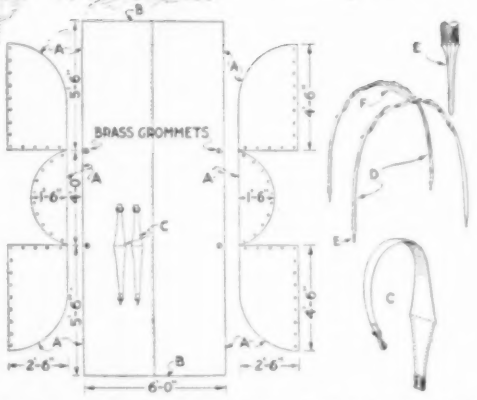
A finish for woodwork in a high-polished black is produced as follows: Prime the work with linseed oil, turpentine, and white lead; apply two coats of black mixed with turpentine and copal varnish. Rub this down with pumice stone and water, and apply another coat of varnish. Rub again and polish to the gloss desired with rottenstone and oil.



Homemade Shoulder-Pack Tent

By J. D. BOYLAN

AFTER sleeping under various kinds of canvas coverings and not finding any of them entirely to my liking, I made the tent shown in the illustration, which proved quite satisfactory. It is of light weight, easily set up or taken down, and when buttoned closely is practically rain, wind, and bug-proof. The cost of materials necessary for making it is comparatively slight. I use it not only as a sleeping tent but also as a carry-all in packing camping equipment. The canvas is supported by frames made of pliable branches cut in the woods.



Stakes, Rope Braces, and Supporting Poles are Not Required for This Shoulder-Pack Tent, the Supports being Cut at the Camp

The layout for the canvas is shown in the detailed drawings. The sections for the ends are made of three pieces, one for the ground and two, divided vertically, for the end covering. The ground section of the main portion of the tent and the covering are made in one piece, 6 ft. wide, joined at the middle, as shown. The adjoining edges A are sewed together and the edges B, which are set at the ridge of the tent, are sewed, after the other pieces are joined. Brass grommets are fitted in the canvas, as indicated, and the points of the supporting frames pass through them in driving the supports into the ground. The shoulder straps C are placed so that they are in position when the tent is folded, and rolled into a pack. Other equipment may be placed inside of it. The tent supports D are pointed at the ends E, and are twisted together at the top. The ridge pole F steadies them and holds the canvas at the middle.

To set up the tent, lay the canvas flat on the ground and place the supports, twisted together, through the grommets. Spring them into the ends of the canvas, and insert the ridge pole by springing it between the supports. The canvas is 8-oz. duck, and the fastenings used are snap buttons; buttonholes, buckles, or harness snaps may also be used.

Rustic Well for a Bazaar or Fair Booth

A feature of a bazaar which attracted much attention was a rustic well from which a pretty girl dipped cool drinks

A Pretty Country Maid, Delicious Lemonade, a Peep into the Well, and Music from a Phonograph Were Attractions at This Booth

with the aid of an "old oaken bucket." The arrangement may also be used at an outdoor fair or lawn party.

A corner of the room was marked off by a rail fence and turnstile. The floor was covered with green cloth and green excelsior, for grass. The well was constructed as shown in the detail sketch. Half of a barrel, B, with the head removed, was inverted, and a mirror, C, was set in a shallow pan of water on the floor. The pan was surrounded with pebbles, D, and a framework, E, built over the barrel. The supply of lemonade was kept cool in the tub G, behind the partition. When the bucket A was lowered into the well, by means of the sweep, it was filled by pouring the beverage in the trough F. The bucket was then raised and the drinks served from it, a cocoanut-shell dipper being used.

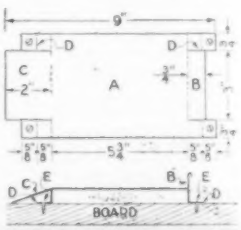
So many persons became curious to learn how the well was constructed, that an admission fee was charged to pass the turnstile, and the reward was a peep at the reflection in the mirror at the bottom of the well.—Susan E. W. Jocelyn, New Haven, Conn.

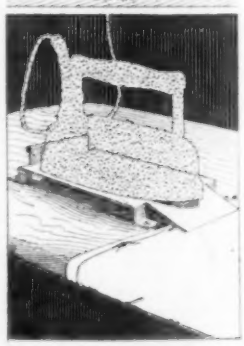
Novel Masks for Printing Pictures

In printing pictures, I have made use of various masks, and those suited to the particular picture, for some special reason, have proved especially popular. For instance, in making a picture for a contractor and mason, a mask in the shape of a trowel was used; for a policeman, a star; an automobile for the motorist. Sometimes the special interests of persons in a picture, or the background, will suggest good outlines for masks.—Russell Waldo, Indianapolis, Ind.

Sheet-Metal Stand for Flatiron

Considerable energy is consumed in lifting a heavy flatiron to the stand which protects the ironing board. The device shown in the illustration was made to overcome this objection to most flatiron stands and proved efficient, as well as easy to make. The iron is shoved onto the stand at one end, provided with an incline. The layout for the sheet metal is shown in detail. The piece A is cut 4½ by 9 in., and the stop B, the incline C, and the leg D, are cut as shown, and bent to shape. The stand is fastened near the end of the ironing board by means of screws.—Ernest Ward, Detroit, Mich.





Homemade Roadster with Motorcycle Engine

By mounting a 5-hp. motorcycle engine on a frame built of 2 by 4-in. stuff, and rigging the outfit on running gear made of gas-pipe axles, old buggy springs, and motorcycle wheels, I made the light roadster shown in the photograph, at small cost. It develops 30 miles an hour easily, carrying only the driver, and has carried five persons. The frame is suspended from the springs, with an underslung effect, on the front axle. The power is transmitted by a friction drive, consisting of a fiber contact pulley, obtained from an old commercial car, and a disk used as a cutter on a plow.

This Friction-Drive Cyclecar was Built in Spare Time by a Mechanic, Using Largely Makeshift Material

The front axle is of 1-in. gas pipe, fitted with suitable-size solid nipples, and washers, at the bearings. The steering knuckle was made of steel shafting turned down to fit a pipe tee, set in the axle. The drive shaft is 7/8 in. in diameter, and has a ball thrust bearing on the end. Sprocket gearing gives a ratio of 6 to 1, on high speed.—E. L. Munsen, La Conner, Wash.

Mending Aluminum Cooking Utensils

Holes in aluminum ware may be mended by plugging them with rivets as follows: Make a rivet of lead or solder, and enlarge the hole to fit the rivet tightly. Insert the rivet from the inside and back it with a piece of hard wood, or metal. Rivet the other end to fill the hole and lap over it slightly. Suitable rivets may be made by cutting a lead wire, about 3/4 in. long, and of the desired diameter, on which a head is formed by riveting down the end. The wire is set in a hole in a block during this operation.—L. C. Burke, Madison, Wis.

Feeding Cards into Typewriter

Trouble is sometimes experienced in feeding cards into a typewriter, and this may be overcome by providing a paper sheet as a leader. Run the sheet of paper into the machine and feed the card in after it, lapping their adjoining edges. This prevents the edge of the card from catching on the rolls.

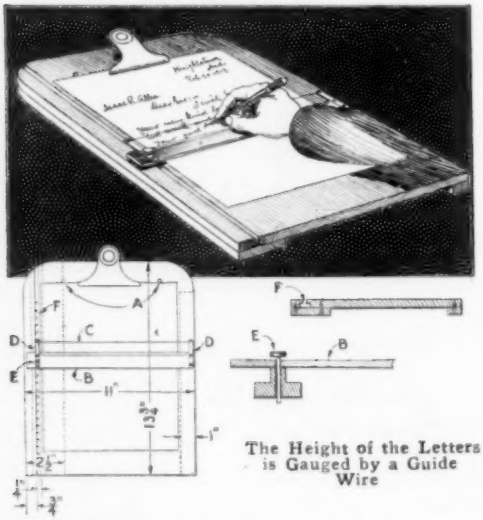
A California Bungalow for Canaries

An outdoor birdhouse, which has proved popular in various sizes, especially for canaries, is that with a bungalow roof, and sides of wire netting, as shown in the photograph reproduced. While a number of these houses were made in a workshop to order, the construction is so simple that boys will find considerable fun in making them, especially in framing the roof. The house shown is 18 by 28 in., and 14½ in. high to the eaves strip. The body of the house is made in two side and two end frames, fastened at the corners with screws. The wire is put on the frames before

assembling them. A small, sliding door, of wood and wire, is provided, or one end may be made in two frames, one of which is hinged for a door. The eaves should extend at least 2½ inches.—H. L. Coolidge, Pasadena, Cal.

Homemade Device Aids Blind Person in Writing

To assist my father in writing, notwithstanding his blindness, I made the machine shown in the illustration. It



The Height of the Letters is Gauged by a Guide Wire

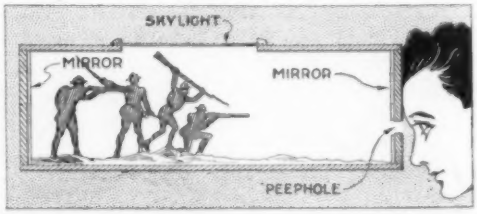
has been in use two years, and proved thoroughly practical. It consists of a board, ½ by 11 by 13¾ in., on which the paper is held by a clip. Two stops, A, insure a good alinement of the sheet. A T-square, B, slides in a groove at the left side; the upper edge is beveled. At a distance of ¾ in. from this edge is stretched a brass guide wire, C, by means of which the height of the script is gauged. The wire is supported on brass strips, D. When the line is written, a pin, E, set in one of a row of holes in the groove F, is raised, the T-square moved, and the pin inserted in the next hole below, giving the correct spacing. As the wire does not touch the paper, either ink or pencil can be used. The board consists of four pieces, glued, and fastened with screws, as detailed.—Arthur E. Tremaine, Brookline, Mass.

Making Cardboard Tubes for Electrical Coils

It is often difficult to obtain cardboard tubes as foundations for coils of special sizes, and the following is a practical method for making them as desired: Cut a strip of cardboard somewhat wider than the length of the tube desired and about 2 ft. long. Soak the cardboard in water until it is quite pliable. Wrap it tightly around a wooden rod of suitable size, gluing or shellacking each successive layer. When the desired thickness has been obtained, bind the tube with string, and place the whole in a moderately warm oven to dry. The tube may then be cut to length.—Alexander V. Bollerer, New Britain, Conn.

An Army in a Small Box

A play device that will afford much amusement and which is interesting for boys to make is that shown in the sketch. To make the peephole cabinet, obtain a box of suitable size; fasten a piece of looking-glass inside, at each end. Make a peephole at one end of the box, and rub the silvering from the back of the looking-glass at the hole. Place a few metal soldiers, horses, etc., along the sides of the box 1 or 2 in. apart, one being set to hide the reflection of the hole. By looking through the hole an endless army may be seen. Light is provided



By Reason of the Mirrors, a Few Soldiers Appear as an Army

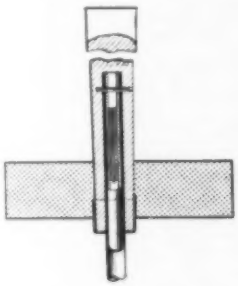
through the skylight at the top, which is fitted with ground glass or tissue paper. This device perplexes most persons who are not familiar with its construction.—James E. Noble, Portsmouth, Canada.

Liquid-Filled Tray Carried Safely

In photographic work, and in the shop or laboratory, chemicals carried in shallow trays are easily spilled. In photographic work, especially, this endangers materials used, as the spilled liquid dries and dust affected by it may spoil chemicals with which it comes into contact. The tray should be carried in a larger pan or basin partly filled with water, thus keeping the tray level.

Making an Umbrella Handle Detachable

A parasol or umbrella with a detachable handle is a great convenience in packing when traveling, and a handle may be made detachable as follows: Remove the handle by using a block of wood and a hammer. Clean out the hole, and polish the steel stem with emery, as far as it goes into the handle. Cut off 1 in. from the end, and then solder a section of brass tubing into this piece, and another section into the end of the stem. The abutting ends are then tapped to fit an 8-32 screw, which is then soldered into the shorter piece, as shown. The latter is pushed into the handle, and a hole, $\frac{1}{16}$ in. in diameter, is drilled almost through the handle. A piece of wire nail is driven into this hole. By making the screw fast in the handle rather than in the stem, the threads are protected, and the length when taken apart is correspondingly reduced.—John D. Adams, Phoenix, Ariz.



¶To renew a typewriter ribbon, roll it on a spool and apply a very small drop of glycerin at intervals of several inches, with a fountain-pen filler, and permit the glycerin to soak in thoroughly.

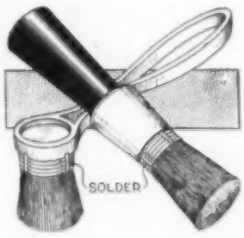
Boys' Athletic-Equipment Locker

The boy should have a place in the home for his sports togs and equipment, and a cupboard like that shown can be made easily for the purpose. Its size will depend on the quantity of articles to be stored. A good size is 12 by 30 in., by 5 ft. high. Plain boards are used, and for the door they are fastened together with cleats and screws. The drawer is convenient but not essential.—J. D. Hough, Toledo, Ohio.

The Boy Who Takes Pride in His Athletic Equipment will Find Much Pleasure in Making This Cupboard for It

Wire Compacts Bristles in Polish or Stencil Brushes

The bristles of brushes used for applying shoe polish and for painting through stencils often curl so much that the brush becomes almost useless. In order to overcome this I bound the bristles with several turns of wire and soldered them into place as shown. When desirable, part of the wire may be removed by cutting it at the solder.—Hugo Kretschmar, West Nyack, N. Y.



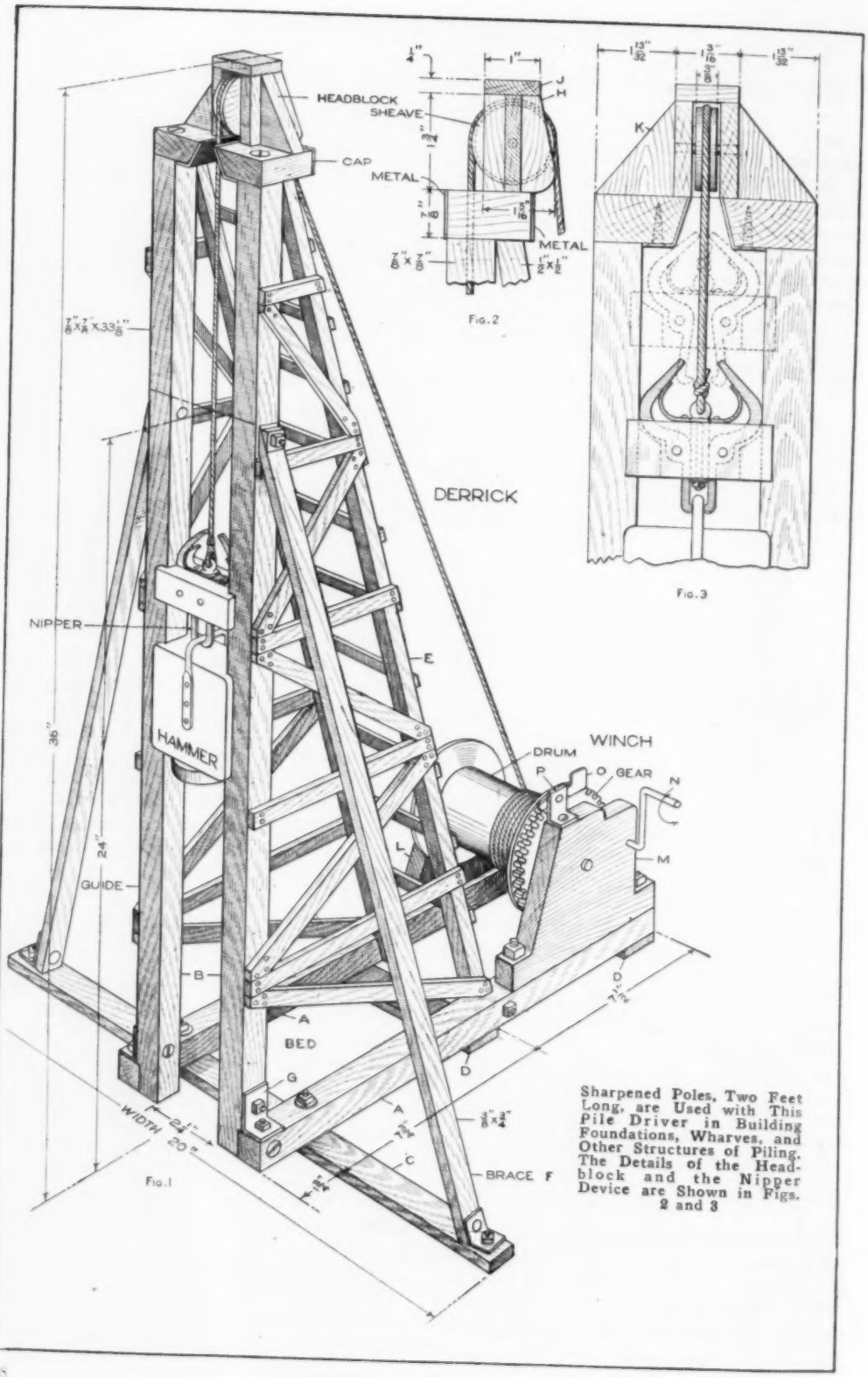


Fig. 1

Fig. 2

Fig. 3

Sharpened Poles, Two Feet Long, are Used with This Pile Driver in Building Foundations, Wharves, and Other Structures of Piling. The Details of the Headblock and the Nipper Device are Shown in Figs. 2 and 3

A Small Working Pile Driver

By EDWARD A. KRUEGER

[These directions will enable boys of varying skill with tools to make a pile driver, as a toy or model. Several simple methods of making the parts in the home workshop, with materials easily obtainable, are suggested.—Editor.]

THE construction of small docks, wharves, piers, and foundations for bridges, buildings, and other structures, by the driving of piling is interesting out-of-door play, in which boys will find much fun. A pile driver for this work is shown in the page plate, Fig. 1. The hammer is raised by means of a winch, and is dropped automatically when it reaches the cap of the derrick, as indicated in Fig. 3. The drum is then released, and the weighted double-hook nipper drops down, picking up the hammer on the next upstroke. A single-hook nipper, that can be made easily of wire, is also shown in the detail sketch, Fig. 6. The small boy who cannot make the nippers or the winch, may tie the rope directly to the hammer, drawing it up by hand, and dropping it as desired. The hammer need not be fitted to the guides, but merely arranged to drop between them, and the derrick can be made of only a few main pieces. The larger parts of the hammer and nipper weight are best made of lead, babbitt, or white metal, as these may be cut or melted readily. Iron, brass, or copper, solid or in plates, may be used, if means for shaping them are at hand.

The making of the derrick may be undertaken first. Make two pieces for the bed A, 7/8 by 7/8 by 17 in.; two hammer guides B, 7/8 by 7/8 by 33 1/8 in.; one bed piece, C, 3/8 by 7/8 by 20 in.; two bed pieces, D, 3/8 by 7/8 by 5 1/4 in.; two posts, E, 1/2 by 1/2 by 34 1/2 in.; two braces, F, 3/8 by 3/4 by 26 1/2 in. Cut these pieces slightly over their finished lengths as given, allowing for trimming and fitting. Make strips, 1/4 by 1/2 in., for the bracing on the sides of the derrick and the ladder bracing on the back.

Notch the lower ends of guides B, 1/8 by 7/8, and the lower ends of posts E, on an angle, 1/8 in. deep, to fit pieces A. Join the parts of the bed, as shown in the page plate, pieces A being set 3 1/2 in. apart, fastening them with bolts or screws. Make braces G, of sheet metal, and bolt them in place. Fit the posts E into place, and fasten them at the bed and the top. Put on several ladder braces temporarily, to steady the frame. Fit the braces F carefully, and bolt them in place. Remove the piece C and the braces F, and nail the horizontal bracing to the sides of the frame. Then fit and nail the diagonal braces. The bolted construction is convenient in "knocking down" the derrick for storing it. Reassemble the parts, and make the cap for the headblock.

The headblock and cap are shown in detail in Figs. 2 and 3. Make two pieces, H, 1/4 by 1 5/16 by 1 3/4 in.; one piece, J, 1/4 by 1 by 1 3/16 in.; two braces, K, 1/4 by 1 13/32 by 1 3/4 in. Make the two beveled pieces of the cap 7/8 by 1 3/4 by 1 1/2 in., and provide a wooden strip or metal plate for the front and rear edges, as shown. Fasten strips of sheet metal to the bevel of the notch, to protect it from wear by the striking of the nipper hooks. Make the sheave 1 1/2 in. in diameter and 3/8 in. thick, with a groove for the rope. Assemble the parts, as shown.

The details of the winch are shown in Figs. 4 and 5, and the method of assembling the parts, in Fig. 1. The

drum may also be driven without gears by fixing the crank directly to the shaft. Gears may be obtained

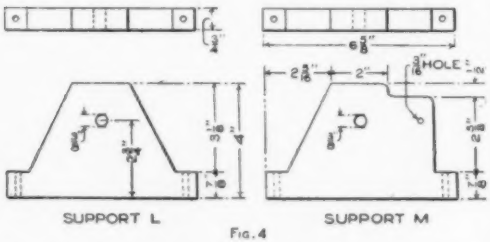


Fig. 4

The Supports of the Winch are Made of ¾-Inch Wood, Bolted to the Bed

from old machines, or purchased from dealers in model supplies. Make the supports L and M, Fig. 4, ¾ by 4 by 6⅝ in., cutting patterns of paper, if desired.

The gear, Fig. 5, is 3½ and the pinion ¾ in. in diameter. The drum is of wood, 2 in. in diameter and 3 5/16 in. long. Its ends are 3½-in. metal disks, fastened with screws. The shaft is a ⅜-in. bolt, 5⅜ in. long, and bears in holes bored in the supports, as shown in the details of these parts. The crank N, Fig. 5, is made of a 3/16-in. rod, bent as shown, and fitted with a washer to fit next to the pinion. The gear is set by means of the pawl O, which is bent from a strip of 1/16-in. sheet metal. The brace P is bent from a 1/16 by ¾ by 1⅝-in. strip of sheet metal, and riveted to the pawl. Assemble the parts, fastening the gear to

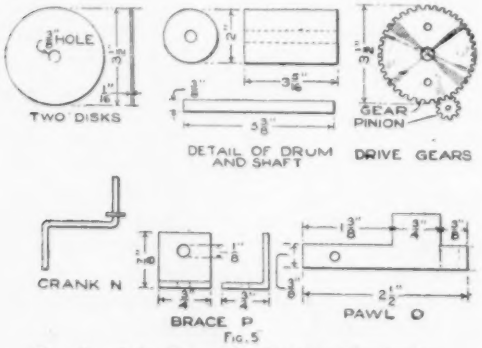


Fig. 5

Details of the Drum, Its Driving Mechanism, and Fittings

the drum end, and bolt the supports into place. Put the pinion into mesh with the gear at its proper place, and carefully mark the hole for the crank. Square the end of the crank and the hole in the pinion, and fit them to a driving fit. Fix the rope to the drum, and reeve it through the head block. The derrick is then ready for the hammer and the weighted nipper.

The hammer, shown in Fig. 6, may be made easily from a solid block of lead, 1¼ by 2⅝ by 2⅝ in. Cut 3/16 by ⅞-in. grooves in the vertical edges to fit the guides. Make the circular 3/16 by 1⅝-in. hammer plate Q of iron or brass, and fasten it with screws.

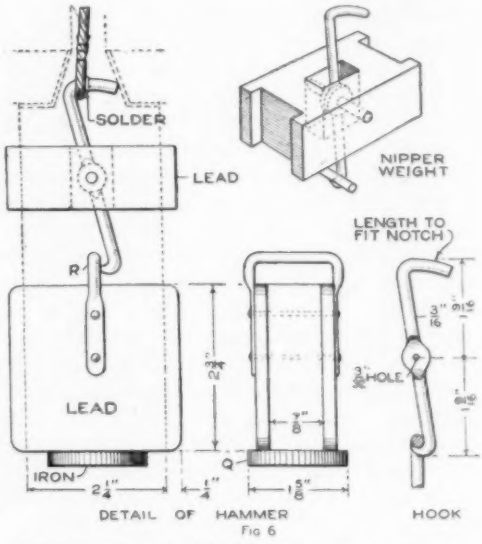


Fig. 6

A Simple Method of Making the Tripping Device, and Details of the Hammer

Rivet the wire lifting strap R, as shown.

The single-hook nipper, shown in Fig. 6, is made as follows: Flatten a piece of 3/16-in. wire at the middle, and drill a 3/32-in. hole for the bolt. Shape the lower end into a pointed hook, and bend the upper end to form the trip arm. This strikes the notch in the cap of the derrick, releasing the hammer. The rope is wired to the hook as shown. The nipper weight is made of a solid piece of lead, 1¼ by 2⅝ in., by 1 in. high, grooved at the ends to fit the guides. Cut a slot through it, for the hook, as shown in Fig. 6, and bolt the latter into place. The double-

hook nipper is better mechanically, and may be made of two pieces of wire, or cut from sheet metal.

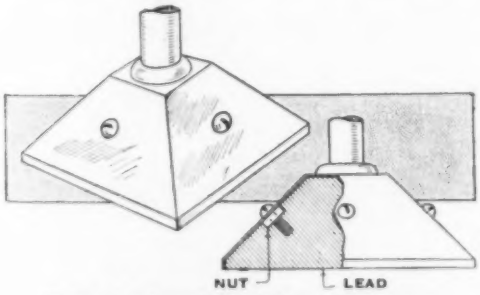
Test the action of the nippers, and bend or file the hooks to operate properly. The pile driver may then be painted, and work on "jobs" begun. If it is used at the water, fix metal guards at the lower ends of the guides, to prevent the hammer from falling into the water.

Split Needle Causes Echo on Talking Machine

An amusing stunt is to split the end of a fiber talking-machine needle carefully about ¼ in., so as to make two points, slightly separated. The needle is then placed on the machine, preferably on an old record, so that the points play the record successively, producing an echo. If the work is carefully done, and the points are separated slightly, both reproductions will be fairly clear.—Frank Murphy, Faribault, Minn.

Weighting a Metal Base

Having to weight a shallow metal base to support a 4-ft. brass tube, I found that the easiest way was to fasten four screws on the base with nuts, as shown in the illustration, and pour



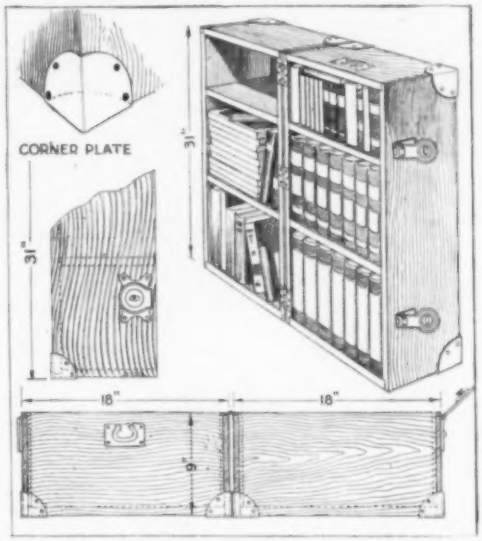
Molten Lead was Poured In around Screws Fastened to the Base

in lead. The screws were taken out in polishing the base.—James M. Kane, Doylestown, Pa.

¶In toasting bread over a camp fire, it is best to cover the fire with a tin pan.

Trunk Bookcase for Convenient Shipment

Mechanics, engineers, and other persons are sometimes engaged in work



A Small Library may be Shipped Handily in This Bookcase

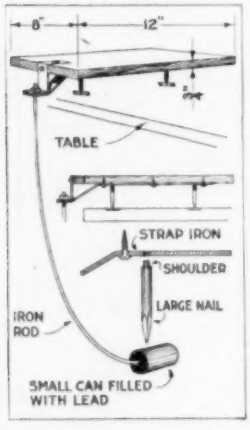
which keeps them at the same locality only a few months. Those who desire to carry with them a small library will find the trunk bookcase, as shown, convenient. It may be shipped as a trunk, and used as a bookcase in one's hotel or dwelling. Other articles than books may be packed in it. The outside dimensions when closed are 31 by 18 by 18 in., providing for three shelves. It may be made of ¾-in. pine or whitewood, and stained, or covered with impregnated canvas. The outer corners are reinforced with metal corner plates, and suitable hardware is provided.—Lloyd C. Eddy, Jr., Buffalo, N. Y.

Bottle Carrier Made of Pipe Straps

Two metal pipe straps, fitted around the neck of a bottle and bolted together, form a convenient method of attaching a carrying handle to a large bottle. The handle proper is made by fixing a grip in a bail of wire similar to that on a bucket.

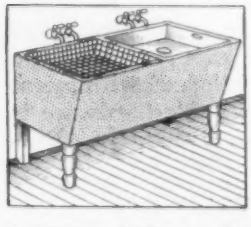
A Developing or Etching-Tray Rocker

An appliance that saves time for the worker in a photographic dark room is a tray rocker, made as follows: Fasten a bracket of strap iron, into which are riveted the pointed ends of two spikes, to the under side of a board, as shown in the detail sketch. Support this further with a double angle fastened at the end of the board. Fix a small can, weighted with lead, on the end of an iron rod, adjusted to a suitable curve, and fasten the rod to the bracket. The weighted end should extend under the edge of the table, as shown, and be balanced so that it will rock the board and tray without tipping the latter toward the bracket. The nails pivot on metal pieces, to protect the table top.—L. L. Llewellyn, Piedmont, Calif.



Combination Laundry Tub and Dishwashing Sink

A saving of space and time was effected in a home kitchen by the use of a sink developed in a large kitchen. Two ordinary laundry tubs were installed with the faucets raised above the tubs, as shown. A sink of sheet zinc was fitted in the upper part of one tub; it has handles, and a strainer set in the bottom. The strainer is closed by a rubber stopper, and the sink becomes a dishpan. The sink is easily lifted out for cleaning, or for washing clothes. Another use for the sink, between meals, is for washing and preparing vegetables and fruits. The second tub has a wire dish-draining rack, in which the china is rinsed and sterilized by hot water from the faucet.—Mrs. Avis Gordon Vestal, Chicago, Ill.



A Leather and Silk Bookmark

An artistic and useful bookmark was made from a silk ribbon passed through a buckle of leather, tooled with an inscription and a conventional design. Ribbon of various sizes may be used, and the leather left plain if desired. The ends of the ribbon are fringed, as shown. Monograms make interesting and individual decorations for the leather portion. —Will Chapel, Manchester, Ia.

Emergency Oarlock of Rope

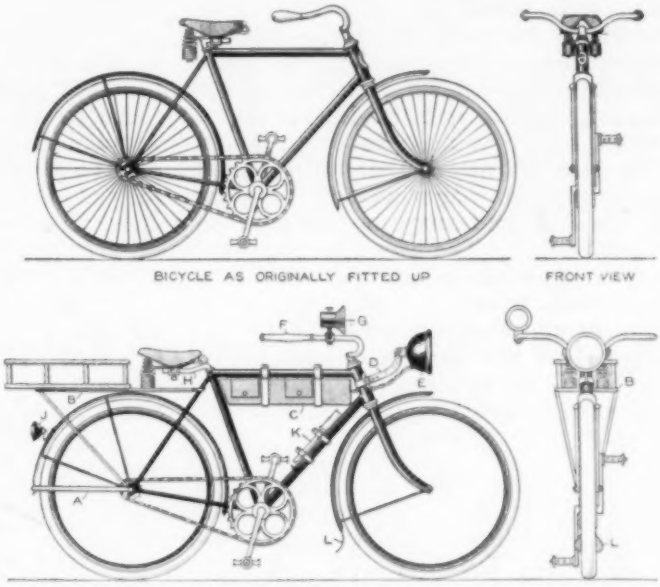
An oarlock that will give considerable service may be made by fixing a loop of rope to the gunwale of a boat at the proper position. This kink is useful in an emergency, such as when an oarlock is dropped overboard.

Planing Thin Sticks Held in Flooring Groove

Boys who make thin sticks for arrows, kites, etc., as well as the mechanic, can make good use of the following suggestion: The difficulty of handling thin strips while planing them may be overcome by setting the strip in the groove of a piece of flooring, clamped in a vise. A peg or nail is driven into the groove and acts as a stop for the end of the strip.

Bicycle Fitted Up to Resemble Motorcycle

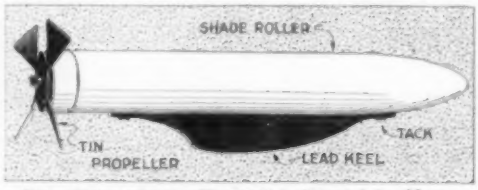
The boy who cannot own a motorcycle but who has a bicycle, may remodel it to resemble a power-driven machine by fitting it up with equipment, much of which can be made in the home workshop. The illustration shows how an ordinary bicycle was improved by several practical fittings. The lower end of the mudguard of the rear wheel was extended to form a clip, for the homemade stand A. Brackets were made of strap iron to support the bundle carrier B, the basket of which was made of wood. The tank C, 3 by 3 by 21 in., with two compartments and doors, contains batteries and tools. It is fastened to the frame by means of two bolted straps. The bracket D was made of strap iron, to support the electric headlight E. The handlebars were extended, as shown at F, and the horn G was provided. The seat post was lengthened by welding a piece to it, and reversed, as at H. A tail light, J, and a pump, K, held by straps, were provided, and the front mudguard was fitted with a leather piece, L, shaped as shown in the front view.—P. P. Avery, Garfield, N. J.



Comparison of the "Before and After" Illustrations Shows Strikingly the Resemblance to a Motorcycle

Toy Submarine Made of Shade Roller

The submarine shown really goes, and was made of a bit of tin, some lead, a few brads, and an old window-shade roller, with a good spring. The spring is the submarine engine. Saw off the roller 3 in. beyond the inner end of the spring, and shape it like the bow of a submarine. Flatten a piece of lead, and fasten it to the bottom of the boat for a keel. Experiment until the keel is of the right weight, and in the proper place, permitting the boat to move evenly, just below the surface of the water. For the propeller, cut a 2-in. tin disk as shown, and bend the blades into shape. In the center make a hole to admit the end of the spring, to which it is then soldered. Wind up the "engine" by turning the propeller. The shade-roller spring can also be used for other toy craft.—E. P. Sullivan, Arlington, Massachusetts.



This Submarine's "Engine" is Wound by Means of the Propeller

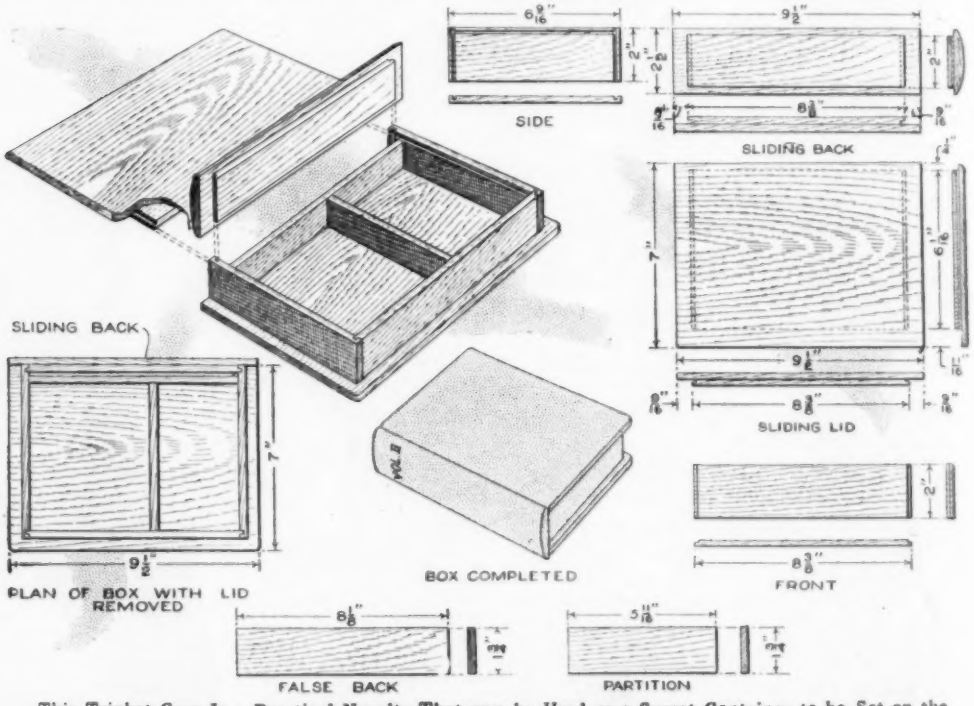
¶Rub powdered graphite on rubber and asbestos gaskets so that they may be removed easily when desired.

A Secret Trinket Case for the Bookshelf

By T. H. LINTHICUM

PRACTICAL use as well as the novelty of its construction makes the trinket case shown in the illustration well worth the time and effort necessary to make it. Various kinds of wood—preferably of the better cabinet varieties—are suited to the design shown, which was made of 3/16-in. stock, like that used in cigar boxes. The size shown is that of a bound volume of a magazine like Popular Mechanics, and may be adapted to special needs. The back and the cover slide in grooves, which are not visible when the "book" is closed, making it difficult and interesting for one to discover how the case is opened. The back may be marked and lettered to resemble a bound volume closely, and if special secrecy is desired, it may even be covered with leather, in exact duplication of those on a bound set of magazines kept in the bookcase with it.

Make the pieces for the frame of the box first. If possible, make one strip of the proper width—2 in., in this case—and long enough for the two ends and the front. Make another strip 1¾ in. wide and long enough for the partition and false back of the tray. Cut these to the lengths indicated in the detailed sketches of the parts. Mark out the grooves in the end pieces carefully and cut them with a saw that cuts a groove 3/32 in. wide. The grooves may be cut by clamping a straight strip of wood on the surface of the ends the proper distance from the top, and sawing cautiously along the strip to the proper depth. The grooves across the grain may be cut similarly, or in a miter box.



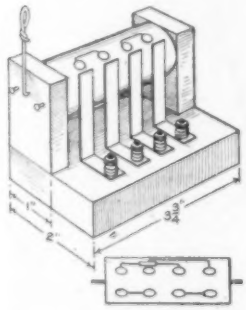
This Trinket Case Is a Practical Novelty That may be Used as a Secret Container to be Set on the Bookshelf with Similar Bound Volumes

Glue the pieces of the frame together, taking care that the corners are square. If necessary, place blocks inside to insure that the clamping will

not disturb the right angles of the box. Shape the bottom and cover pieces nearly to the final size before gluing them; then, if small nicks are made in the edge, they may be removed by a cut of the plane, when the case is complete. Glue the sliding pieces to the cover and to the back. This must be done carefully, and it is convenient to drive small brads part way into the second piece, from the inner side, to prevent the pieces from slipping while being glued. If proper care is taken, only a small amount of glue will be forced out, and this can be removed with a chisel when dry. The edges may be trimmed off to their exact size, and the entire construction given a final light sandpapering. It is then ready for the stain and shellac, or other finish. The parts that slide in grooves should not be shellacked or varnished, because this is apt to cause them to stick.

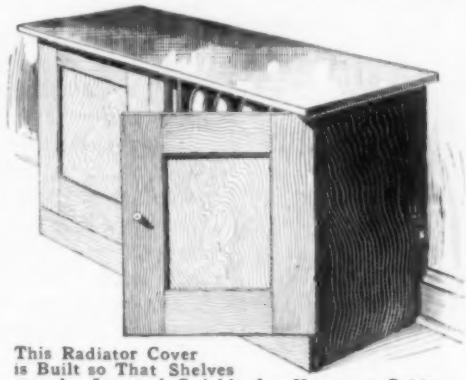
A Cylinder Reversing Switch

A cylinder reversing switch for small battery motors may be constructed cheaply, from a 3-in. length of broom handle and ½-in. boards, as shown. The four brushes are strips of copper. The contacts on the moving cylinder are eight brass tacks, connected as indicated in the diagram. The wires are insulated with paper where they cross. The handle is of heavy wire, and two tacks limit its motion, as shown. The method of connecting the switch is as follows, for either a series or shunt motor: Remove the two wires from the motor brushes, and connect the two middle brushes of the switch to the motor brushes. Connect the wires removed from the motor brushes to the outer brushes of the switch.—Claude Schuder, Sumner, Ill.



Summer Radiator Cover Serves as Cupboard in Winter

Because of the accumulation of dust on a kitchen radiator in the summer,

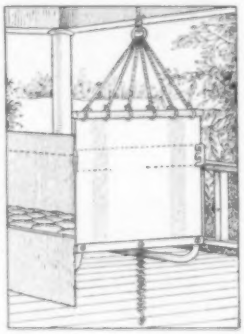


This Radiator Cover is Built so That Shelves may be Inserted Quickly for Use as a Cabinet

a cupboard was built over it, and used at other seasons of the year for the storage of various articles, by fitting it with shelves. While in use as a radiator cover, the top of the cupboard provided a convenient seat. If properly made, cabinets of this type can be used in other parts of the home to advantage.

A Safety Spring for Porch Swings

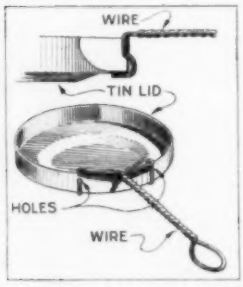
It is often necessary to hang swinging porch seats fairly close to surrounding woodwork, which is marred by their swinging too far. To overcome this, procure a coil screen-door spring and cut it in two. Bend a hook on each cut end, and fasten one of the springs to the center of each end of the swing, and to the floor. This permits only gentle swinging.—F. C. Hayes, Niagara Falls, Canada.



¶ Proper ventilation of cellars makes it desirable to provide a screen door on the cellar entrance.

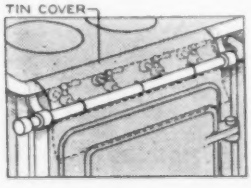
Frying Pan Made of Tin Cover

If you want an egg done to perfection try the frying pan made of a tin cover. It was intended for emergency use only, but proved so satisfactory that I kept it as a regular fixture. The wire handle was fitted to the rim through two holes, as shown, and hooks under the bottom of the pan, the twisting of the wires giving the required strength.



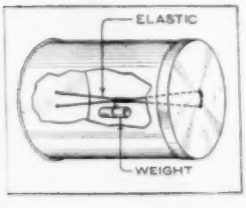
Safety Cover for Valves on Gas Stove

In order to safeguard the valves of a kitchen gas stove with which children might occasionally meddle, I fitted a sheet-metal cover over the valves, as shown in the sketch. The cover is wired to the feed pipe and is swung forward, as indicated by the dotted outline, when not in use. Small catches may be fixed at each end of the cover, if desired.—Leroy Schenck, Mount Vernon, N. Y.



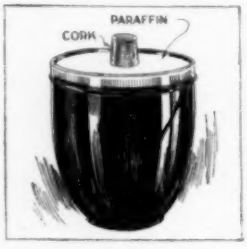
A Come-Back Rolling Can

An interesting toy may be made by fitting a rubber band into a tin can and weighting it as shown. When the can is rolled on the floor it will return to its original place by reason of the weight which is supported on a string at the middle of the rubber band. The latter is passed through two holes at each end of the can, and when the can is rolled along the floor the elastic is wound at the middle. The weight reverses the direction of rolling.—Albert French, Hamilton, Ontario, Can.



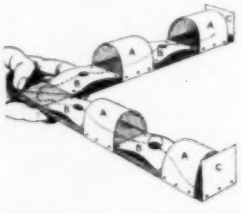
Removable Paraffin Covers for Jars

To remove paraffin from the tops of glasses or jars of preserves, without getting bits of the covering into the contents, is difficult. When pouring the melted paraffin over the top, put a small cork in the center and let the paraffin harden around it, as shown. To remove the covering, dip the top of the glass in hot water. This sealing can be used again by placing it on the top of hot jelly, the paraffin melting and adhering to the glass.—J. E. McCoy, Philadelphia, Pennsylvania.



A Marble-under-Bridge Game of Skill

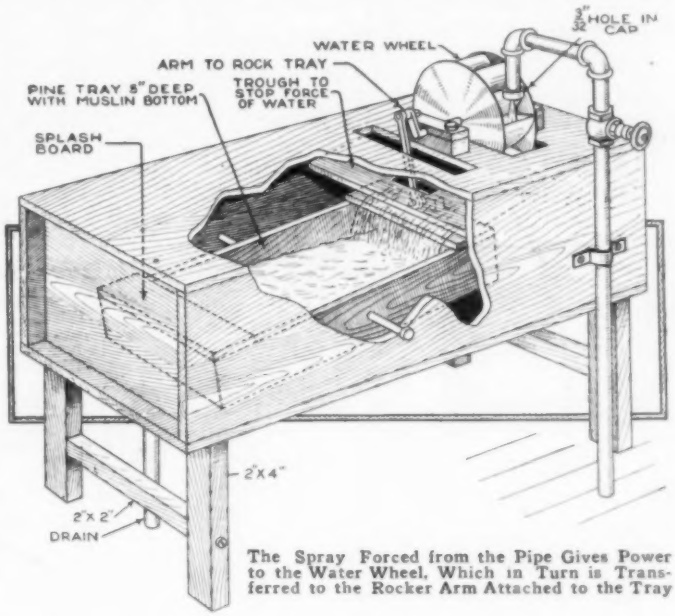
The object of this game is to pass a marble from one end to the other of the "roadway," under the "bridges," and over the "inclines," without dropping it. A stop must be made at each hole. The device is made as follows: Cut two pieces of wood, ¼ by 1¾ by 12 in., and join them to form a right angle. Cut pieces of cardboard, 4 each, 1¾ by 2½ in. wide, with a ¾-in. hole in the center, for inclines B, and 1¾ by 3 in., for bridges A; also two pieces 1¾ in. square for stops C. Fasten them with tacks as shown. The marble should be large enough so that it will rest in the holes at B.



Photographic-Print Washing Machine

By HARRY MARCELLE

MANY amateur photographers have occasion to make a considerable number of prints and find the washing of them tedious, by the ordinary methods. In order to overcome this difficulty the print-washing machine shown in the sketch was made. It is simple in construction and performs the work quite satisfactorily at a saving of not a little time. Since the water in which the prints are washed must be agitated, a pivoted tray is provided. A unique feature is the water wheel through which the water supply passes, at the same time developing power to operate the rocker arm, by means of which the tray is agitated.



The Spray Forced from the Pipe Gives Power to the Water Wheel, Which in Turn is Transferred to the Rocker Arm Attached to the Tray

The frame for the large trough, which contains the tray and other apparatus, is made of 2 by 4-in. uprights, braced with 2 by 2-in. pieces. The trough is made of ⅞-in. stock, joined at the ends with a water-tight grooved, or dado, joint. The top is fitted to form a cover and may be hinged or arranged as a lid, supported and held in place by cleats, fixed on its under side with screws. The trough and its fittings may be made of a size suited to individual requirements. The device illustrated is 4 ft. long, and has a trough 18 in. wide and 13 in. high. The interior of the trough is given a coat of tar to make it waterproof, and the exterior may be painted thoroughly to preserve the wood.

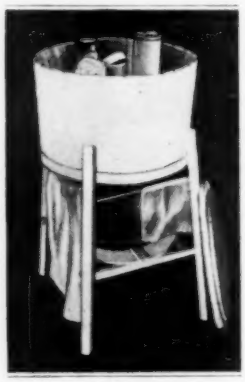
The rocking tray, in which the prints are placed, is made of ⅝-in. stock. It is 5 in. high, 15 in. wide, and 28 in. long. Splash boards are fixed at its ends, as shown, and the bottom is made of muslin, reinforced with wooden strips, ½ in. wide. The tray is supported on a rod or pipe at its center, the ends of the support being set into the sides of the trough. A crank arm of wood or metal is attached to the center of one end of the tray, and operates through an opening in the top of the trough. The crank arm engages a crank fixed to the shaft of the water wheel, as shown in the sketch. The crank must be made not longer than 2 in., or the resulting action on the tray will pour out too much water, the prints being thus in danger of damage.

The water wheel is made of two round disks of sheet metal, 9 in. in diameter. Strips of wood are fitted between them so that the wheel is 3 in. wide on the face. Wooden blocks, grooved to fit the shaft of the water wheel, are used as bearings. They are fixed to the top with bolts. The water supply is provided through a pipe at one end. A cap is fitted over the end of the extension on the pipe and a small hole drilled through it. This forces the water against the blades of the water wheel rather than permitting it to drop under normal pressure. The flow of water is regulated by the valve on the

supply pipe, and the excess water is drained off at the opposite end of the trough. The force of the water, as it leaves the water wheel, is lessened, and the water carried gently to the tray, by means of a board set between the top and the tray, at the wheel end of the trough.

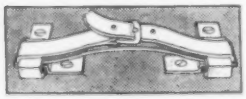
A Washstand for the Baby

To make this washstand, I mounted a cheese box on a frame 20 in. from the floor, and fitted a shelf between the legs 9 in. from the floor. In the center of this shelf a hole was cut, with a compass saw, to hold a washbasin. Rods between the legs are handy for towels, washcloths, etc. Within the circular box are kept baby's toilet and bath articles. The inside of the box is padded with cotton and lined with nainsook, the latter being used, also, for the cover. When the cover is on the box, the stand is used as a small table. White enamel gives the stand a neat finish.—F. E. Brimmer, Dalton, New York.



Carrying Strap and Lock for Hand Cases

The illustration shows how to make a locking device for hand cases or satchels, and providing, also, a strap for carrying. Cut two pieces of ⅝ by 2-in. strap iron, and two pieces, 2½ in. long. Bend them, and fasten them with screws or rivets, as shown. When the case is carried, the strap holds the crosspieces firmly.

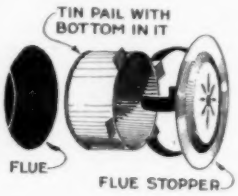


Disk Talking-Machine Records Played Eccentrically

A hole was bored about an inch from the center of a disk talking-machine record and the latter was placed on the machine with the new hole over the center pin of the table. When the record was played, the result was a reproduction extremely amusing and hardly recognizable as compared with the original one.

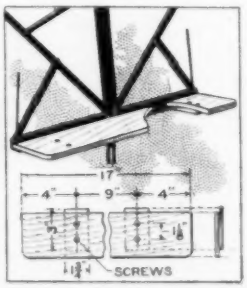
Safety Flue Stopper Made of Tin Pail

The usual method of covering stovepipe holes in chimneys with a tin disk is not as safe as it should be, especially adjoining nonfireproof material. A safer method is to fit a tin can, or a tin pail, into the chimney hole, as shown. Cut it off the right length, with a pair of tin shears, leaving projections as stops, and replace the disk stopper.—J. A. Raught, Janesville, Wisconsin.



Book Rest for Music Stand

The music-stand attachment shown in the illustration aids in the handling of music books, and is easily made. Some stands are provided with a supporting edge about 1 in. wide and will not properly carry larger music books, and the device is attached to this edge. The device is of wood, 3/16 by 3¼ in., and the length of the stand. On the bottom, two wood strips are fastened. They are beveled as shown in the sectional view, to wedge on the music rest.—L. R. W. Allison, Newark, N. J.



Old Table Used as Wall Workbench

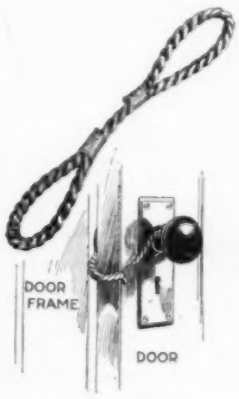
Good use was made of an old table, one leg of which was broken, by removing two of the legs at one side and fitting the table against a wall. A wide board was set on the back edge of the table, against the wall, and provided a rack for tools. A drawer was fitted into the front of the table, and a small iron vise was clamped at one end. The arrangement provided a convenient bench for home shop work.

Lettering Photo Prints without Marking Negative

Instead of scratching titles on photographic negatives, which often produces a poor result, a good method is to write the title on the sensitive paper with black ink before printing. Care must be taken not to scratch the paper. The toning and fixing baths wash away the ink, leaving the script or lettering white. The negative is thus unmarred.

Rope Pad Prevents Slamming of Door

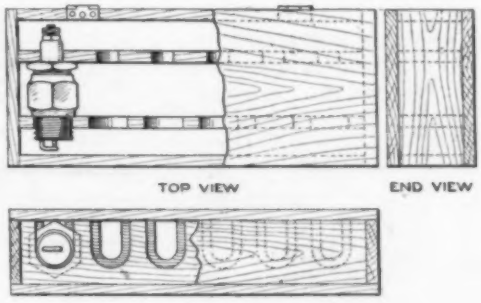
An antislam pad, made of a piece of rope and fixed to the knobs of doors, is in general use in a large hospital. The device is made by forming loops on the end of a short section of rope, as shown, and fitting them over the door knob. This also prevents the closing of the door so that a patient may be heard in calling an attendant.—C. M. Hall, St. Louis, Missouri.



¶Curtain rollers should be arranged so that the direction of pull on the tacked edge of the curtain is away from the end.

Box to Protect Extra Spark Plugs

Damage often results to spark plugs which are thrown in the tool box of an automobile, and the use of a small case for the extra spark plugs is desirable. Partitions may be fitted into an old box of suitable size, or a case may be specially made. That shown was designed to provide for six spark plugs in a minimum of space. It was made of ¼-in. wood, and of a length so that the spark plugs could be slipped in the recesses only by turning the faces of adjoining plugs together. A hinged cover keeps them firmly in place.—E. R. Mason, Danville, Ill.



The Spark Plugs are Fitted Compactly in the Case and are Protected from Damage

Homemade Spring Wagon Seat

Two ⅞-in. boards, 12 in. wide, between which two 12-in. pieces of 2 by 4-in. wood are bolted, provide a strong spring seat for a wagon. The boards are cut to a suitable length, and the 2 by 4-in. pieces are set near the middle, and about 8 in. apart. This gives a spring seat at each end of the device.

Cushioned Chair Made of a Barrel

A strong barrel may be made into a comfortable chair by cutting it halfway through at the middle and shaping the remaining upper portion into an arm and back rest. Holes are bored at the seat level and at the back, and wires woven through them to form a backing for excelsior-stuffed cushions.

See Page 847

ATTRACTIVE LITTLE CHURCH COSTS MODEST SUM

The Photograph Reproduced at the Top Shows the Church as It Appears Today, While the Sketch Pictures It as It Was Originally, Before Quarters for the Sunday School were Provided by Adding the Wing

AS an example of what a small congregation can do with limited funds, the members of a certain denomination at Orlando, Fla., some time ago erected an unpretentious but inviting frame chapel on a bank of one of the many small lakes of that vicinity. The structure, as then constituted, offered a single room 25 by 41 ft. in size, and cost, exclusive of painting, $1,545. This provided sufficient floor space for 100 chairs. More recently a wing has been added to the building and a pleasant room that serves both for parlor and Sunday-school purposes, outfitted at an expense of $646. This amount included the cost of painting the whole building, equipping a toilet and kitchenette, and installing four gas heating stoves. In most respects the edifice has the exterior appearances of a cottage, and thus is homelike and attractive. For approximately $600 the furnishings, consisting of chairs, screens, china, bookcases, and a piano, were obtained.

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